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Today's keynote—

PRODUCTION ECONOMY

Today's answer—

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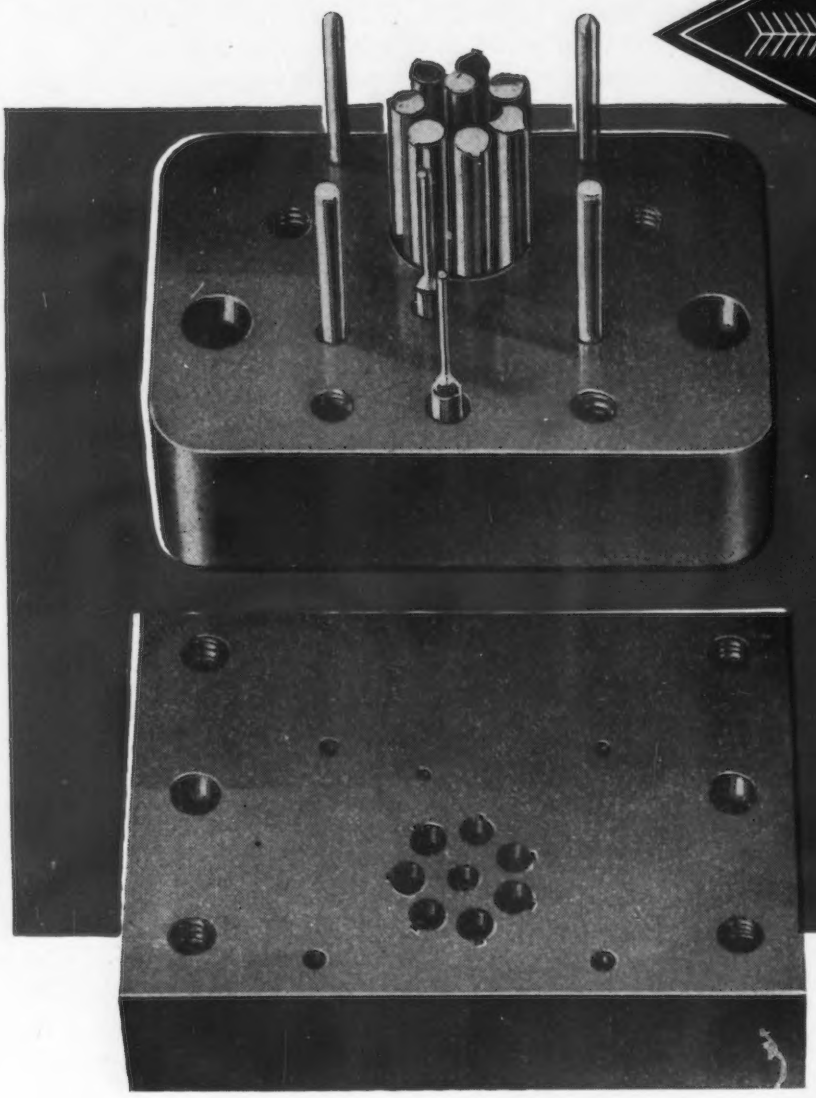

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The IRON AGE

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Getting Back to Arithmetic

IN these days of star gazing and the juggling of astronomical figures regarding national debt, income and corporation profits, it is difficult to keep one's feet on the ground. The mental absorption of amounts running into ten or twelve digits has an effect upon the average man, whose income may run to four, similar to that produced by four or five martini or champagne cocktails. But recourse to simple arithmetic should cure the hangover.

Government, of course, sets the pattern. In dealing out billions for this and billions for that with a free hand on the taxpayer's purse, it promoted a psychology in which the decimal point has become a forgotten symbol. A bureaucrat who today thinks or talks in less than millions is as out of date as the penny and receives as little consideration as the latter gets.

Naturally this sort of thinking at the top has permeated the layers beneath and the man in the street is not to be blamed for thinking that the income and resources of America are unlimited and that it is up to him to get his fair share of it.

So when the man in the street hears the labor leaders ask for a $2.00 per day hike in wages, and that corporation earnings in 1940 were close to $7 billion after taxes, he is likely to say "well, why not let them have that extra two bucks a day and me too."

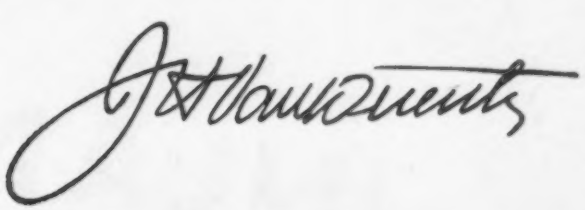
Only trouble with that is that there are such a lot of me's! If you are talking of handing out bigger slices of pie in the form of $2 chunks, you cannot in fairness stop with the automobile workers or the steel workers. It ought to be broadly distributed among public servants, railroad employees, farm labor, garbage collectors and everybody who works for wages. And there were a little over 45 million of these "me's" in 1940.

Putting arithmetic to work on the basis of a two buck raise per day and a five-day week for these equally deserving citizens of ours, the amount of mazoola necessary to stake the raise would amount to twenty-three billion four hundred million dollars. And that is more money than anyone ever saw except the keeper of our national debt ledger and he sees it only on paper and not in cash.

Nineteen forty was a pretty good year for corporation profits because taxes were not as steep then as now. But if we had confiscated all corporation earnings that year after taxes and not permitted a penny of dividends to be paid to stockholders and divided all that sum of $7 billion among our 45 million wage earners, each one would have received a raise of $3.50 per week.

"Well," the man in the street may say: "Business next year will probably be twice as good as that from what I hear." Personally, from what I see of factories being shut down throughout the land I am inclined to doubt it. But assuming that it was and that we jumped from our 1940 $7 billion net earnings to $14 billion and gave all of the increase to labor, the answer would still be $3.50 per week.

I understand that arithmetic is not as popular as it used to be and that political economy is today's favorite subject. Even so, it needs a little arithmetic to bring it down to earth.

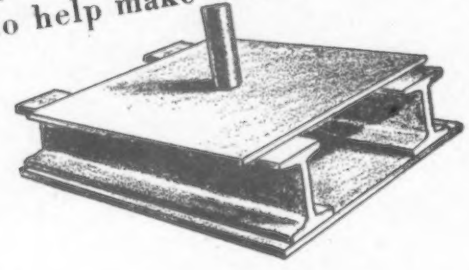


the Happiness of this Christmas

more than ever rests upon

A FOUNDATION OF STEEL

It
was ★
the steel
in the hands
of fighting men
★ steel in all kinds
of weapons ★ that won
the Victory which makes
this Christmas so filled ★ with
good cheer and happiness. The boys
are coming home ★ in steel ships ★ on
steel rails and in airplanes that depend
upon ★ steel for engines and many other parts.
Their presence gives this holiday ★ that old-time
family reunion flavor ★ makes it the gayest yuletide we've
known for many, many years. For this we raise our voices in
thanks, in the old familiar ★ carols of spontaneous song ★ In all
humility, ★ we are proud of the service we have been able to pro-
vide to help make this Christmas gay.



INLAND STEEL COMPANY
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INLAND STEEL

The IRON AGE
Dec. 18, 1945

NEWSFRONT

► Scarcity in Germany of alloying agents such as molybdenum, nickel and columbium led to the development of heat-resistant stainless steels of lower alloy content.

In some cases the strategic alloying elements were replaced with manganese, titanium and vanadium. Shortcomings of these heat-resistant alloys as jet-plane blading material were offset in large measure by clever design.

► Rotoshaving can be applied to finish machining operations of cylindrical, flanged and conical parts. Similar in principle to the gear shaving process, the number of cutters that may be used is dependent only on the number of surfaces to be finished in one setting.

► German steel mills, even in the last desperate months of war, were never as hard pressed for manpower as was United States steel management. As late as Jan. 1, 1945, steelmaking units in Germany proper employed some 798,000 persons, representing a loss of only 29 pct to the armed services compared with 36 pct lost to the military forces by the U. S. steel industry.

Germany used twice as many women in its steel plants as did the United States. About 41 pct of the German labor force were foreigners, of which 18 pct were prisoners of war (primarily Russian) and the remainder slave labor.

► German steel capacity (excluding steel capacity in conquered countries) at the war's end was almost 36,000,000 net tons. Despite bombing and other difficulties of wartime operation production was at the annual rate of 27,000,000 net tons.

► Contrary to popular belief, Bochumer Verein not Krupp was the prime producer of heavy ordnance in Germany. This most desirable bombing target just a few miles from Krupp was practically ignored during the entire war.

► Subjecting cooling weld metal to a plastic strain greater than that corresponding to the yield point of the metal prevents those failures where no ductility is observable.

► The Norris Stamping & Mfg. Co. of Los Angeles expects to enter the national household utensil and electrical equipment market and is reported to have entered into a contract with Sears-Roebuck for distribution of a long line of products.

► The type of postwar conflict between private plant and government built facilities is forecast by Kaiser's protest to RFC over the sale of pig iron by Geneva to Bethlehem Pacific Coast.

► Britain is so far from returning to her peacetime standard of liberties that 50 wartime regulations are being continued for an additional two years.

► Sweden's atom brains-trust considered by certain British and U. S. scientists to be ahead in certain respects of the Anglo-American atom teams, is to be placed at the disposal of Britain and America.

► British missions to the U. S. now employ 5712 persons at salary and allowances totaling $18 million a year. Of these 4200 are recruited in the U. S. at a yearly cost of $10.4 million.

► The British cabinet has under consideration plans for the creation of a National Investment Board to direct investments toward providing steady jobs for the greatest number.

► Howard Hughes's enormous flying boat, the so-called flying lumber-yard, will probably not be test flown for another year. Costing some $20 million it will cost an additional $2 or $3 million to transport it from Culver City to water for take-off.

All plywood, the ship is undoubtedly the greatest single piece of genuinely beautiful cabinet work ever put together.

► The U. S. Steel Corp. is due for a great many top personnel changes in the next few months. Many men have reached the 65-yr retirement age during the war and were held over temporarily. Four subsidiary presidents will retire by March.

► Persistent rumor has it that the final disposition of the Geneva Steel plant will involve a combination with Fontana, with Cyrus Eaton and Harry Kaiser forming a company and floating a public stock issue. The Allen group, Wickwire Spencer and Colorado Fuel & Iron, may even be bought within the combination, and some observers believe that R. J. Wysor, now in Germany, may be offered the presidency.

Straining of Weld Metal During

By E. PAUL DeGARMO
Associate Professor of Mechanical Engineering, University of California

FAILURE of certain welded structures, wherein almost no ductility was observable, has raised many theories as to the possible causes. Since these failures nearly always originate in weld metal, which in normal tension tests exhibits excellent ductility, it was natural that much speculation should exist as to the reasons why this same metal did not behave in a ductile manner in these cases. The belief has been expressed that some of the inherently available ductility of the weld metal might have been consumed by the straining that takes place during the cooling of the weld metal when it is deposited in a structure wherein the plates being welded offer considerable restraint.

Because it is extremely difficult to make measurements at the elevated temperatures which exist during the deposition of weld metal and its subsequent cooling, relatively little work has been done toward determining what occurs during this process. It was to obtain a measure of the plastic flow that takes place in a weld as the result of cooling that this investigation was undertaken.

When a weld is made a relatively small amount of the base metal is heated and melted, and a small quantity of molten metal is deposited. There is thus the necessity for the molten metal to cool, solidify and further cool while bonded to a large mass of metal at, or slightly above, ambient temperature. When the weld deposit solidifies it assumes the dimensions dictated by the geometry of the base metal at that time.

The greater part of the base metal does not undergo any great temperature change (perhaps less than 100°F change for the most part) during the entire process, and its physical dimensions do not change appreciably. Also, since it has its full strength, it offers great resistance to dimensional changes.

The weld metal, on the other hand, undergoes a temperature change of around 1400°F in cooling from the solidification point to ambient temperature. During this cooling the weld metal would like to contract approximately 0.000006 in. per in. of length per °F, or a total on this basis of 0.008 in. per in. If the weld metal were, in effect, given a plastic strain of this amount the effects would not be great. Moreover, when it is appreciated that during much of the cooling (or straining) period the mechanical properties of the weld metal are very low, as indicated in fig. 1, and the plastic flow occurs easily, and further, that metallurgical transformation takes place during the cooling, it appears doubtful if the effective strain is as great as 0.008 in. per in. Also, since the temperature of the base metal varies from ambient up to the melting point over a few inches adjacent to the weld deposit, some of the restraining metal immediately adjacent to the weld deposit is expanded, and also contracts during cooling. Thus it is probable that the effects of straining during cooling should not be as great as those caused by a cold strain of 0.008 in. per in.

Since this complex set of conditions regarding temperature, strength and metallurgical transformation exists, it is extremely difficult, if not impossible, to make a direct determination of the effective plastic strain that takes place. However, it appears that the answer can be obtained by an indirect method.

It has been found that the longitudinal strain in a butt-fusion weld is essentially as shown in fig. 2.[1,2] The weld metal at points A, B and C is subjected to different amounts of strain during cooling. The metal at

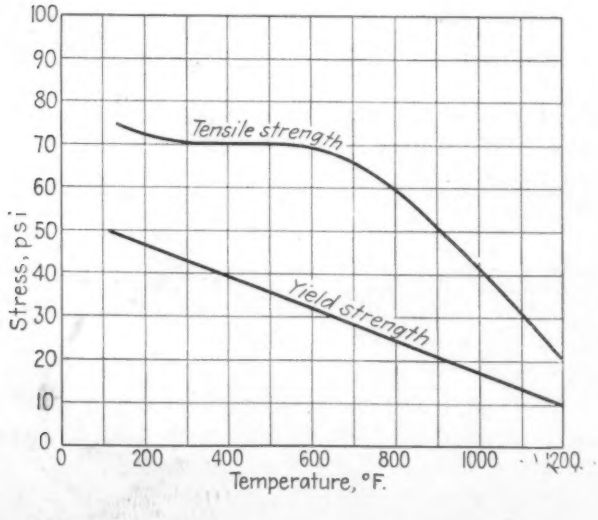

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FIG. 1 — Effect of temperature on the properties of steel, indicating the extent to which yield and tensile strength drop at elevated temperatures.

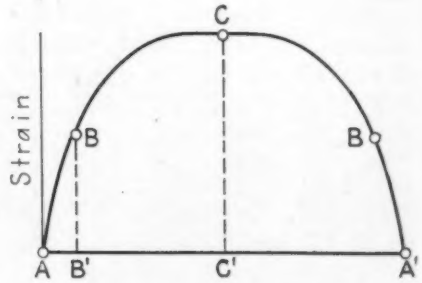


FIG. 2—Chart showing the relation of the strain along the length of the weld, and indicating that metal at A, B, and C is subjected to different amounts of strain during cooling.

Cooling

. . . Weld metal in normal tension tests usually exhibits excellent ductility, but in certain cases failures have occurred in which the metal has shown almost no ductility. To discover the reasons for this, the author conducted some interesting tests, which are described herein, and reached the conclusion that weld metal, in cooling, may be subjected to a plastic strain greater than that corresponding to the yield point of the metal.

A has had no plastic strain. At C a stress equal to the yield point is found, indicating that the metal at this point at least has been strained elastically to the yield point.[3] Because of the shape of the stress-strain curve just beyond the yield point, it is possible that the metal might have been strained plastically to an appreciable extent beyond the strain corresponding to the yield point and still not indicate greater than yield point residual stress when measured by relaxation methods.

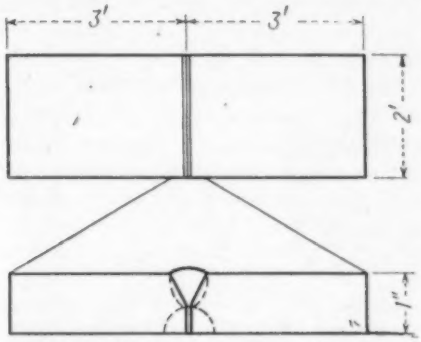


FIG. 3—Test plates were made up to the dimensions shown above, and were welded by Unionmelt.

[1] *H. E. Kennedy, "A Method of Relieving Residual Stresses in Welds," The Log, September* 1944.

[2] *W. Spraragen and M. A. Cordovi, "Shrinkage Stresses in Welding," Welding Journal, May* 1944.

[3] *W. G. Theisinger, "Stress Relieving and Preheating,"* THE IRON AGE, *Oct.* 13 *and Oct.* 20, 1938.

If tensile specimens were taken from a weld at points A, B' and C', these should reflect in their tensile properties the amounts of plastic strain which they experienced during cooling. If the tensile properties of these specimens were then compared with those of other specimens which had been subjected to known amounts of plastic strain, a measure of the effective plastic strain of the weld metal due to cooling could be obtained.

Two Unionmelt welds were prepared as shown in fig. 3. The size of the plates was sufficient to assure at the mid-length of the weld, maximum possible longitudinal strain due to cooling. The plates were tack welded using 2-in. tacks on 12-in. centers. Run-off tabs were provided at each end of the joint. Both passes were deposited at 35 v, 1050 amp with a machine speed of 13 in. per min. Linde ¼-in. electrode No. 36 was used with Unionmelt No. 20—200 flux. After the first pass was deposited the plates were turned, flame gouged, and the second-pass run.

The following day ¼-in. tensile specimens, as shown in fig. 4, were cut from each weld, being taken from the locations indicated in fig. 5. Thus, as shown in fig. 5, ten specimens were cut from each weld. Specimens 1, 2, 3, 4, 5 and 6 had received no plastic strain during cooling. Specimens 9 and 10 had been strained a maximum amount while specimens 7 and 8 had been strained some intermediate amount.

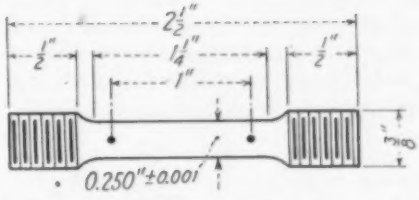


FIG. 4—Tensile specimens were cut from the test plates to the dimensions shown above.

In order to obtain a calibration curve of tensile properties vs. known amounts of plastic strain, specimens 1, 2, 3 and 4, which had not been strained plastically during cooling, were strained plastically the following amounts:

Specimen No. 1 = ½ pct
Specimen No. 2 = 1 pct
Specimen No. 3 = 3 pct
Specimen No. 4 = 5 pct

Since specimens 5 and 6 had been subjected to practically zero strain during cooling, they were used to give results corresponding to 0 pct strain.

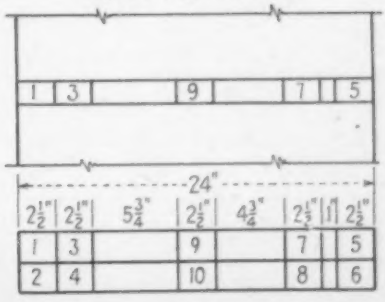
In order to measure the strains a special "clip gage" was used. This gage has been developed at the University of California for making very accurate strain measurements where considerable extension occurs. As shown in fig. 6, it consists of a phosphor-bronze clip on which are mounted two SR-4 electrical resistance strain gages. The ends of the clip can be fitted between pins soldered to the specimen or into nicks in the specimen. In this case a small amount of solder was deposited on the specimen where each end of the clip gage was to rest. Small nicks were then made in the solder and the gage fitted into these nicks. In this way it was not necessary to put nicks in the body of the speciment to support the gage ends. The clip gage was held in position by means of rubber bands, fig. 6.

After specimens 1, 2, 3 and 4 had been strained plastically, all of the specimens were heated for 2 hr at 212°F in order to accelerate strain-age embrittlement prior to testing.

On the following day all of the specimens were tested in tension to destruction. The tests were conducted with extreme care so as to obtain precise readings at the yield, maximum and ultimate loads. After fracture the total elongation over the one inch gage length was determined.

The results obtained from the tests of the two welds are shown in fig. 7. In each case a curve of yield point

FIG. 5—Locations of the test specimens in the butt weld were carefully selected to obtain samples with differing degrees of plastic strain.



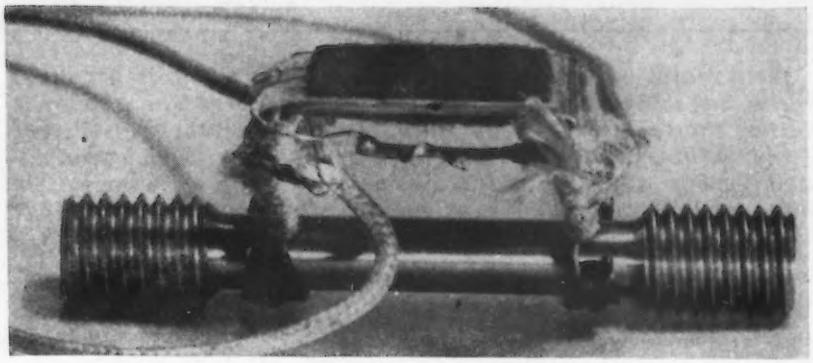


FIG. 6—Clip-type strain gages mounted on each specimen served to indicate electrically the amount of strain.

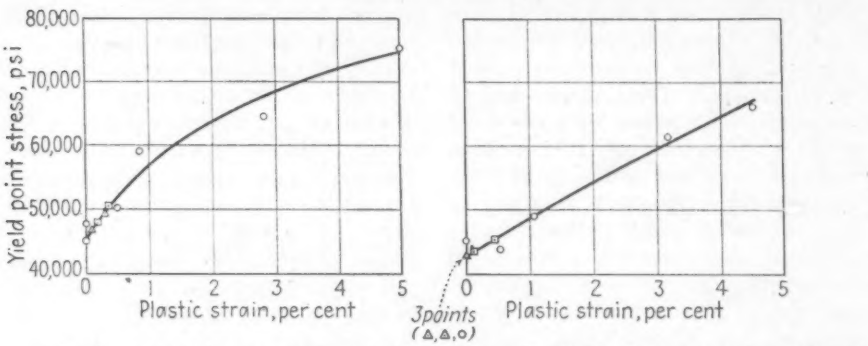


FIG. 7—Curves of yield point vs. strain, plotted for the two test plates, serve to locate the percentage strain to which specimens were subjected during cooling.

stress vs. plastic strain was drawn. The yield point stresses for specimens 7, 8, 9 and 10, having unknown amounts of strain, were then located on the curves. The locations of these points upon the curves give the corresponding effective plastic strains to which these specimens were subjected during cooling of the deposited metal. Since plate II was the second one made and tested, it is probable that the results obtained were slightly more reliable than those for plate I.

It may be seen in fig. 7 that the maximum effective plastic strain was less than ½ pct. This is in agreement with the statement made previously that the effective strain should be less than the 0.008 in. per in. due to simple thermal contraction. On the curve for plate I it will be noted that the four specimens, 7, 8, 9 and 10, fall into two groups. The two specimens 7 and 9 from one side of the weld form one group, while the other is composed of specimens 8 and 10 from the other side of the plate. This phenomenon was not observed in plate II.

It is thus apparent that the yield point stress which is measured by relaxation methods at the mid-length of such a weld does not indicate all of the strain to which the weld metal has been subjected. However, it is equally apparent that the maximum amount of strain which occurs is not at all serious.

As might be expected, the yield point values gave more significant differences than the ultimate or breaking stresses. In general, the latter showed the same relative results but the effects of small differences in strain were not so pronounced.

While the tests were conducted on Unionmelt welds the results apply also to manual welds since the strain condition indicated in fig. 2 is the same for both types.

From the tests conducted the following conclusions were drawn:

(1) In a butt Unionmelt weld greater than 20 in. in length the weld metal at the mid-length is subjected during cooling to a plastic strain greater than that corresponding to the yield point of the material.

(2) The maximum effect of such straining upon the tensile properties of the weld metal is less than that of a 0.5-pct plastic strain at room temperature.

Borings Sintered by Greenawalt Machine

THE use of the Greenawalt machine for sintering cast iron borings is being given increasing attention in England under the sponsorship of Tornblad & Lees, 46 Victoria Street, London, the European licensors for the process. Back in 1942 J. E. Greenawalt described similar experiments carried out at the Pittsburgh Steel Co. plant.

The method consists of treating it in a specially designed Greenawalt sintering apparatus whereby the cast-iron borings, granules, and swarf are converted into a more or less porous cake of steel suitable as scrap for the openhearth furnace. The borings etc., are slightly moistened and placed in the sintering receptacle without any addition of fuel, and treated in the usual way by igniting the surface of the charge and subjecting it to the suction of an exhaust fan. Within a few minutes the charge is brought to sintering temperature and the oxidation of the carbon, silicon and manganese in the material, produces enough heat to bring the whole into a semi-molten state. The oxidation proceeds at a very rapid tempo so that in from 10 to 15 min the whole charge is converted into steel.

Thus cast-iron borings analyzing: Graphite, 3.35 pct; combined carbon, 0.70; silicon 2.10; manganese 0.85 sulphur 0.09, and phosphorus 0.17, produced a steel scrap analyzing: Graphite nil; combined carbon 0.35 pct; silicon 0.20; manganese 0.20, sulphur 0.06 and phosphorus 0.17.

Throwing Power Of Anodizing Baths

. . . A device is described for visually determining, especially in the case of blind holes and crevices, the corrosion protection afforded by anodizing baths. It also can be applied to measure the throwing power of plating baths.

By ROBERT S. HERWIG
and
ALBERT LEIGH
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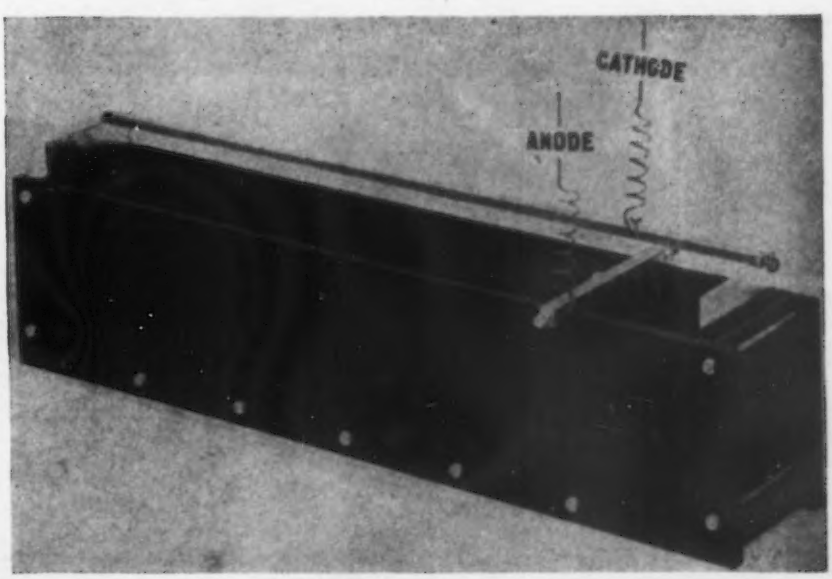
TO a plater, the throwing power of a bath is that property which is measured by the uniformity of the plate received by an object with recesses and cavities of varying shapes and depths. Attempts have been made by electro-chemists to give a more precise definition to the concept so as to permit its easy measurement. Inasmuch as the number of factors involved is quite large, none of these definitions have been applicable to the practical comparison of plating solutions. Generally speaking, those throwing power equations which are useful from a research point of view deal with surface films and potentials existing across thin layers of electrolyte close to the work. Such factors are difficult to evaluate from measurements of the molar properties of the bath and so do not lend themselves to practical use.

Several methods for measuring throwing power directly are in use. Perhaps the most widely favored is that of Blum and Hogaboom[1]. They introduce the terms "primary current distribution," defined as that distribution of current density which would exist on the cathode in the absence of polarization, and "secondary current distribution" which is that actually existing. Throwing power is defined as the "improvement (or worsening) in percent of the actual metal distribution ratio." A negative throwing power exists when the primary current is more uniformly distributed than the secondary, as is the case in chromium plating.

The Blum and Hogaboom throwing power box is usually made of hard rubber, or other suitable material. A typical box is 12 in. long, 4 sq in. in cross-section provided with a bus bar and filled with the bath, fig. 1. An anode 4 sq in. in area is placed between two cathodes each 4 sq in. in area, the ratio of whose distances from the anode in the case of chromium plating being rarely, if ever, greater than 2 to 1. The distance ratio is proportional to the primary current distribution and the weights of metal deposited are proportional to the secondary current distribution or metal distribution ratio. Thus, the Blum and Hogaboom throwing power can be easily calculated.

Although this method does not measure all of the variables involved, according to certain experiments of Pan, the primary current distribution is not important. Because of the poor throwing power of chromium baths a higher primary ratio than 1:2 cannot be handled. In practical plating the ratio in cavities may well be less than this Pan. In this, as well as all other practical methods, the actual numerical results obtained depend upon the details and dimensions of the apparatus employed. A disadvan-

FIG. 1—Blum and Hogaboom type of box used for measuring the throwing power of plating baths.



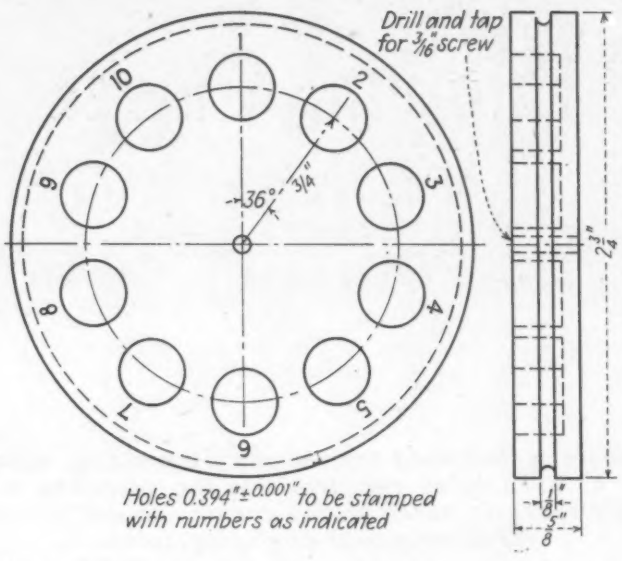


FIG. 2—The Pan cavity type throwing power indicator is a disk made of plain-carbon steel with holes drilled to various depths. In practice two indicators are made with hole depths in inches (±0.001 in.) as shown below:

Indicator "A" Hole Number				*Indicator "B" Hole Number*			
(1)	0.039 in.	(6)	0.236 in.	(1)	0.020 in.	(6)	0.118 in.
(2)	0.079 in.	(7)	0.276 in.	(2)	0.039 in.	(7)	0.138 in.
(3)	0.118 in.	(8)	0.315 in.	(3)	0.059 in.	(8)	0.157 in.
(4)	0.157 in.	(9)	0.354 in.	(4)	0.079 in.	(9)	0.177 in.
(5)	0.197 in.	(10)	0.394 in.	(5)	0.099 in.	(10)	0.197 in.

tage here, however, is that the number finally obtained as a measure of the throwing power can be either positive or negative, with the actual throwing power depending largely upon the primary ratio used. Thus a set of numbers alone, without collateral information cannot be used to compare a throwing power.

A more flexible and perhaps a truer measure of throwing power is given by Pan's [2, 3] method. A disk of the base metal to be plated, about 2½ in. diam is drilled to various depths with a ring of ten holes about ½ in. diam concentric with the circumference of the disk. The disk is provided with glass backing and suspended in the bath in a definite position and plated for a definite time. The throwing power is defined as 100 times the ratio of the depth to the diameter of the deepest hole satisfactorily covered when the outside surface is not "burned." Thus this method always results in a postive number, and comparable results can be obtained by suitable standardization. Inasmuch as a double cathode of the Blum and Hogaboom type is not employed, the same primary current distribution is obtained.

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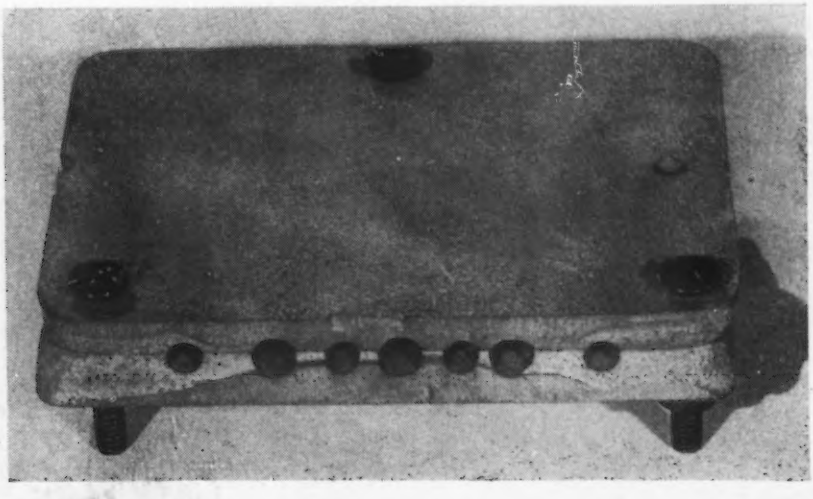
FIG. 3—Anodic bath throwing power indicator assembled for immersion in bath.



The procedure is much like that used in actual plating and the ideas involved in the method correspond closely to the plater's conception of throwing power. As the holes are very close together, electrode distance factors and all effects of the configuration of the bath container are thus compensated. Thickness of plate can be determined by the use of electromagnetic or magnetic thickness testers or by dropping reagent procedures, and the method can be adapted for research purposes by making the depth differential between the holes small.

A knowledge of the conditions effecting the measurement of the throwing power of a plating bath, such as a chromium plating bath, is necessary before intelligent use can be made of a throwing power indicator such as Pan's[2]. Accordingly, a list of the "macro factors" found to be of significance are listed, without regard to importance, as follows:

(1) Shape of cell (bath container)
(2) Cathode polarization
(3) Cathode efficiency
(4) Conductivity of the bath
(5) Current density
(6) Shape of electrodes
(7) Concentration of sulfuric acid
(8) Temperature
(9) Dissolved iron
(10) Concentration of chromic acid
(11) Condition of cathode surface
(12) Ratio of surface areas of anode, cathode
(13) Distances between electrodes
(14) Hydrogen effects
(These are not stated in order of their importance)

Certain of these factors are not easily measurable or are vaguely defined. The conditions of the surface, its precise relation to cathode polarization, the precise effects of hydrogen evolution—both physical and chemical—the effect of the shape of the tank upon current "lines" and thus directly upon throwing power, are all largely unknown. The effect of agitation of the bath upon the throwing power still remains to be investigated. The shape of electrodes as a factor is quite un-

predictable, inasmuch as the cathode is the object to be plated.

For practical uses, the change of all these factors with time or age of the bath, or number of amp-hr passed through it should be known. For a given problem, however, certain of these variables can be taken as constant. Thus the shape of the tank is often determined by the floor space available, the shape of the electrodes (cathodes) may be the same over a long period of time, and the surface of the basis metal fixed by same definite preplating treatment.

Measuring Anodizing Baths

The cavity indicator of Pan suggested a method of constructing a throwing power indicator that would apply to the measurement of anodizing baths. No attempt was made to give a numerical rating to this device as it was constructed not for any theoretical conception of throwing power but rather for practical applications. Advantage was taken of the drawbacks of the Pan indicator in constructing this modification, namely, the difficulty in determining the depth to which the deeper cavities were covered and a convenient method of measuring the thickness gradient on the walls. Also, visual indications were difficult when the base metal of the indicator was of steel and the metal plated was similarly colored.

This anodic bath indicator can be made from either aluminum or magnesium. The first experimental indicator was made from two pieces of cast Alcoa aluminum, 195 T6 measuring 6x4x½ in. The sides and ends were faced off and one side of each piece was lapped. The lapped faces were bolted together and placed against a backing plate and holes of various sizes were drilled into the end face between the lapped surfaces (fig. 2).

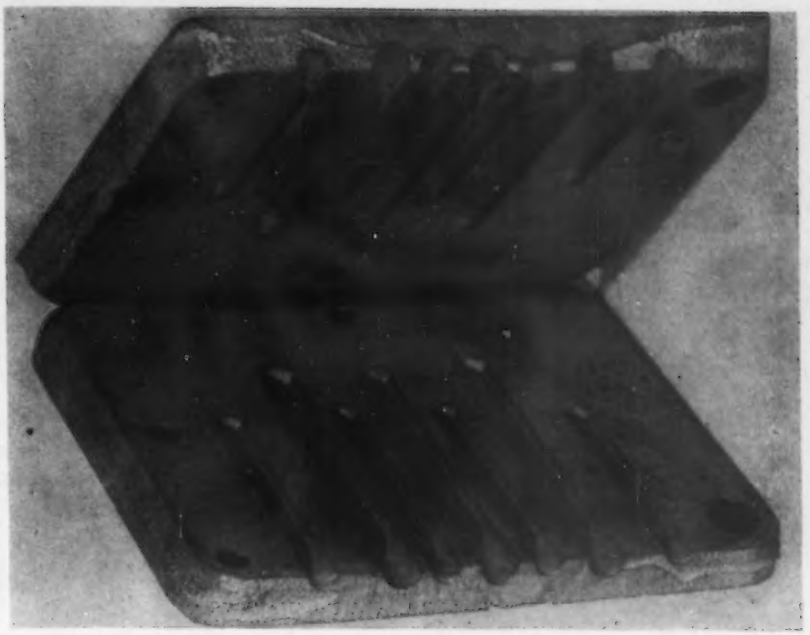


FIG. 4—Disassembled indicator, showing how protection of cavities can easily be determined.

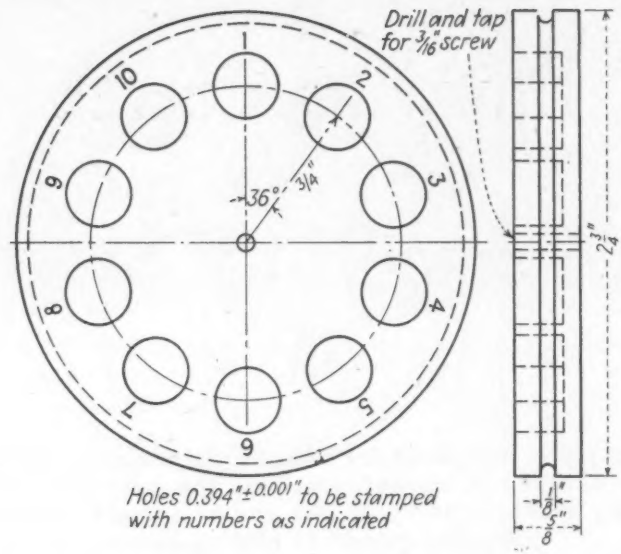
This indicator is excellent from a design standpoint, as the holes drilled can be of sizes that are actually present in the design casting. The information is of importance in that the designer desires knowing whether certain blind holes will be anodized and therefore be protected from corrosion. In the indicator described, the sections can be taken apart and visual examination made of the various blind holes, fig. 3. If the anodic coating is colorless such as happens on many anodized aluminum alloys the assembled indicator is dipped into the black dye bath. The dye will be absorbed in the oxide coating only and the depth of color will be proportional to the depth of oxide. This will enable the user to obtain readily a visual examination of the throwing power of the anodizing bath. If desired, the opened indicator can be submitted to salt spray. This will destroy the usefulness of the indicator. However, it is inexpensive and can be made very easily and quickly.

This indicator is not limited to anodizing baths. It has been constructed of steel and brass in order to check the throwing power of various plating baths, excluding chromium. It is the opinion of the writers that this indicator described is better suited for design applications than any of the throwing power indicators investigated. To qualify this statement further, the engineer is not interested in the relative throwing power of the various plating baths but knowledge in the extent that the blind holes in this product will be plated and thus offer some corrosion protection.

Spectroscopic Control for Tropenas Converter

THE development of a converter flame during the blow and the appearance and disappearance of certain lines of the spectrum observed through the direct-vision spectroscope points to the possibility of controlling the convertor blow without introducing the human factor, and the consequent elimination of over and underblown heats. Such practice has frequently been employed in the U. S., particularly by the J. & L. Steel Corp. The British method is described in a paper by S. T. Jazwinski before the Iron and Steel Institute, London. No attempt was made in these preliminary investigations to measure the wavelengths of the bands, only their relative positions being recorded. A very faint continuous spectrum appeared at the beginning of the blow and grew stronger as the flame became brighter. The most pronounced yellow band appeared when boiling began; when ejects ceased a green band, faint at first, appeared. During the carbon flame two other green bands and two red bands became visible. At times a blue band was discernible. When all bands disappeared the wind was shut off.

The disappearance of the red, green, and yellow bands is an indication that the blow is finished and the carbon near 0.1 pct. If the wind is not shut off when the bands disappear, the heat becomes overblows, with consequent low carbon content, higher losses of metal due to oxidation, and excessive wear on the lining. The conclusions point to a very definite relationship between the bands in the flame spectrum and the composition of the metal in the bath. This leads directly to the application of the "electric eye" to the Tropenas converter to attempt a more rigid control of the process.



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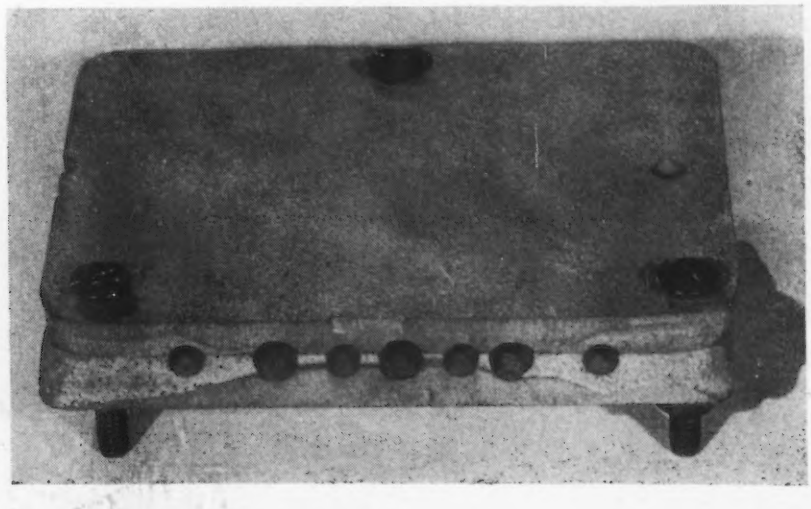

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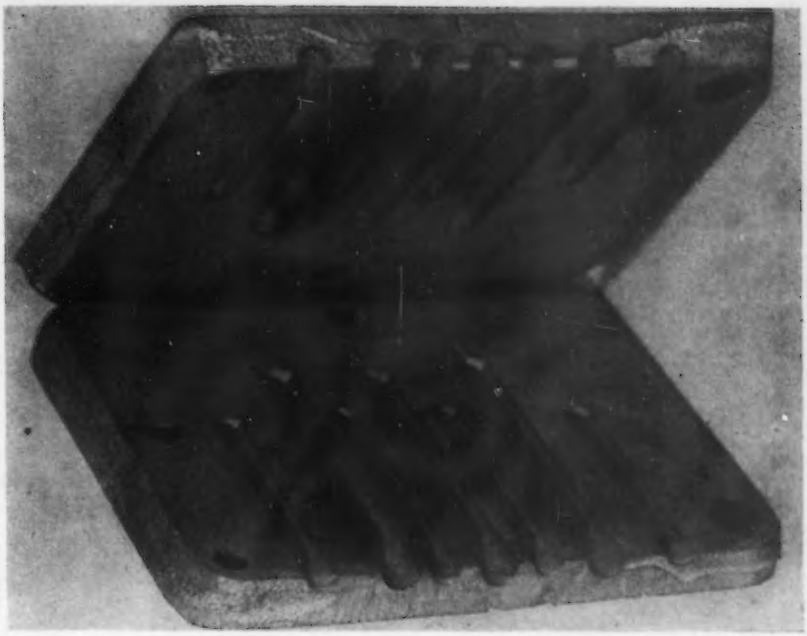

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The German Steel Industry . . .

. . . High production, little damage and only a few technical innovations characterized the steelmaking units that armed the Nazi army. The German all-basic openhearth practice is now being tried in the U. S., and a number of other minor practices warrant serious consideration. Surprisingly, German draft withdrawals from steel mills were proportionally less than in the U .S. and the percentage of women employed was not much greater than U. S. wartime totals.

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By T. W. LIPPERT
Editor, THE IRON AGE

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FOR the past century many an important metallurgical and operational innovation first found commercial exploitation in the German steel industry. This fact, along with the German's well-recognized technical curiosity, led to a general expectation that the immediate prewar and the war periods would give rise to a variety of developments of interest and of value to the steel industry in the United States.

The German steel industry, however, turned out to be considerably more impressive in reputation than in performance. In the prewar period the rearmament demands of the Nazi regime were so insistent as to leave little time or sympathy with experimental efforts, and in the war period the supply of home steel, and the output from conquered plants, were in such comfortable supply that at no time was the steel industry a favored child, or the recipient of any high-priority favoritism. Throughout the war period the steel producers received only the barest minimum of repair parts, and new construction was limited to the huge Hermann Goering plant at Salzgitter, near Braunschweig, a fantastic outpouring of money and effort into a showplace, having no equivalent other than the war-built Geneva and Fontana plants in the U. S., and having a future even more questionable than these latter two plants.

There were, however, a variety of comparatively minor features associated with German steel production which were of interest.

Labor was cheap and plentiful in Germany, as elsewhere on the Continent, and for that reason there was somewhat less emphasis on labor-saving machinery than in the U. S. Probably the most obvious indication of the relatively weak position of labor is the frequent absence of even the most routine safety devices. Little effort was made to protect the worker against the hazards associated with steel making, and even railings frequently were absent on elevated platforms such as charging floors. But, surprisingly enough, excellent facilities often were provided for the workman's health, at times there being well-equipped clinics with elaborate dental, medical, X ray and similar equipment, and even provisions for steam baths and sun-tan treatments. It would seem that the health of a workman was of more concern than his life.

The industry was always called upon to supply small-lot orders, which resulted in a large amount of dual equipment, large stocks of rolls, and the likelihood of a roll change once during a turn. It was this supply of dual equipment, with one unit operating while the other was having rolls changed, that prevented undue hardship during the war through lack of repair parts. Robbery of parts from one unit could always keep the other in operation.

Far beyond the experience of operators in the U. S., German blast furnace plants always were based on a variety of ores, all usually poor in character, and quantities of which varied from week to week depending on volatile trade and political factors. This led to great skill in ore blending, great dependence on sintering, and what would be by U. S. standards an excess number of blast furnaces to cover certain steelmaking commitments.

The German steel industry was completely integrated with the life of the community, more intimately so than in the U. S. Coke was practically a secondary product to the supply of gas to the civilian economy, large blocks of excess power fed into the local and national gridworks, and great quantities of Thomas fertilizer meant life or death within several years to the rural economy. It is this complete integration that makes the de-industrialization of Germany such a hazardous undertaking. Such de-industrialization seems most proper, and here in the U. S. most everyone can emotionally approve, but it will mean death to many millions of Germans, particularly in the British zone of occupation which encompasses the entire Ruhr. It is difficult to see how even the partial resumption in steel operations, being countenanced by the desperate British, can even approach minimum power and fertilizer needs of rump Germany southwest of Berlin.

Although directed by the Nazi party command to sabotage their steel mills when retreat became inevitable, there was not one single incident of sabotage. Blast furnaces were usually banked, other furnaces were usually cooled slowly to prevent refractory damage, and the bulk of production facilities required just a minimum of patching up to go back into operation. In fact, combat forces hardly had moved out of a plant before the plant officials were casting about trying to find someone to O.K. the disposal of corpses and to specify what and how much steel to make.

The ever dominant instinct of self-interest among the steelmakers was evidenced in also a more subtle way, a way that was a sabotage of Germany's own war effort. The very heavy build-up of finished steels, sometimes amounting to hundreds of thousands of tons, and ingots and other semis, also amounting to some hundreds of thousands of tons, was obviously an effort in the last months of the war to plow labor, power and money of questionable value into in-

THE bessemer department of the Hermann Goering works near Salzgitter. Scrap charges were made by mobile charging machines operating on the platform in the foreground.

destructible real wealth which could not be looted. All this drained power and labor out of the Nazi economy during the period of most desperate need, but was the most foolproof way for industrialists to transfer wealth into the economy set up by the conquerors. This same type of thinking dominated certain types of construction, as for instance a most expensive and well equipped heavy forging shop practically finished in an area obviously doomed for early capture.

No Sabotage by Slaves

As is now such common knowledge, each steel plant, as well as all other industrial enterprises, had adjoining it one or several slave-labor camps for housing the Russian, Polish, French and other nationals conscripted for plant labor. These camps were pretty much of uniform design, not a great deal unlike the concentration-camp barracks for Japanese in the U. S. or the facilities set up for West Indian labor imported into the U. S. several years ago. The barracks were always quite crowded, shy of adequate bath, washing and cooking facilities, and populated with about twice as many men as women. Generally the health of these slave laborers looked pretty good, nor was the anti-German feeling quite of the intensity that conditions and treatment would seemingly warrant. It was from these barracks, however, that the weak and worn-out were processed by the SS extermination camps which have been so constantly in the news.

The slave-labor camps were so much part of the scene and for so many years an accepted part of the plant operation that German officials were nonplussed with indignant questioning regarding them. Slave laborers and Germans worked side-by-side in the plant, and sometimes the percentage of slave labor ran up to over 80 pct, and only in some instances were Russians barred from critical areas of the plant. There was fraternizing between the slaves and the Germans, much like the affairs between Italian and German war prisoners and girls in the U. S. and Britain. There was no evidence of plant sabotage or even any significant deliberate slow-down on the part of the slaves, the checks being both fear and a certain degree of disinterest.

Surprisingly enough, the manpower pressure in Germany's steel mills, even in the last desperate months of the war, was not so intense as in the U. S. Steel management in this country, which sweated through the entire war with the Armed Forces progressively draining away all experienced personnel, might be interested to know that on Jan. 1, 1945, prewar German steelmaking units employed some 798,000 people, and from the war's outbreak up to the Jan. 1, 1945 date some 221,300 persons had been drafted, or otherwise taken by the Armed Forces. This represents some 28 pct so lost, and compares with some 36 pct lost to the Armed Services by the U. S. steel industry.

Of the 798,000 employed in German steel works on Jan. 1, 1945, there were 636,000 men and 162,000 women, which is over twice the percentage of women as in the U. S. steel mills. About 41 pct of the German labor force were foreigners, and of this 41 pct foreigners, or 327,200, some 60,000 were prisoners of war (primarily Russian) and the remaining 267,200 were slave labor, considerably less than half of which were from Russia and Poland. The distribution of German men and women, and male and female slave labor were of about the same order.

It is of interest to note that on Jan. 1, 1945, the 798,000 employed in prewar Germany were producing some 2,413,000 net tons of steel monthly (capacity 2,983,000 tons) which represents about 3 ingot tons per month per person. This compares with 10 ingot tons per person per month in the U. S. This might not be considered quite a fair comparison, however, as German labor late in the war was devoting a great deal to overcoming blackout conditions, air raid alarms and alerts, shortages of gas, power and raw materials, lower efficiency of female labor and much lower efficiency of slave labor. However, in 1942 German steel mills working primarily with German labor still turned out little more than 3 ingot tons per person per

month. The fact that an American worker produces over three times as much steel as a German is not traceable entirely to a greater supply of labor-saving machinery here, but apparently is partly attributable to more efficient and energetic performance in this country.

Some rather low figures have been given for German steel capacity in the newspapers, which would indicate that someone is getting mixed up in metric and net tons, or failing to account for all production in all districts. Actually, German steel capacity at the war's end was almost 36,000,000 net ingot tons, a figure considerably higher than intelligence estimates. And by Germany is meant prewar Germany, without the inclusion of conquered facilities in Austria, Alsace Lorraine, Luxemburg, Bohemia and Moravia. At the war's end, despite bombing and other difficulties of wartime operation, production was at the rate of 27,000,000 net tons of ingots yearly, again a figure considerably higher than the usual estimates in newspapers.

In this new atomic bomb age it possibly is completely redundant to point out that air raid damage to the steel plants were predominantly to the building roofs, overhead cranes, water, power, gas and wind lines and plant transportation facilities. It is generally known by this time that serious raid damage to major production units such as blast furnaces, steel furnaces and rolling mills was negligible. Plant air raid shelters were excellent, being very deep, of reinforced concrete, with elaborate precautions against gas, and usually located beneath stock piles of scrap, pig iron or ingots. In fact, it was so much safer in plants than at home that absenteeism was negligible.

German plant officials were completely frank as regards facilities, plant records and all other information of similar operational type. But never would an official admit the death of another official in an air raid. Frequently an associated official known to have been killed in an air raid at home would, on questioning, be stated to have disappeared, or be located elsewhere in the country, or in some instances stated to have died from some natural cause. No amount of probing could disclose the motivation, uniform and widespead as it was, for this evasion of an unpleasant fact.

The reserves of iron ore in Germany was estimated by the Nazi government in 1937 to amount to approximately 1.6 billion tons. The deposits are usually small, widely scattered, and most of them are remote from coal fields. The principal deposits actively mined before the war are in the Siegerland, Peine-Salzgitter, Bavarian and Lahn-Dill districts. Hardly any of the ore mined would be classified as high-grade. The great bulk of the medium-grade ore has from 30 to 40 pct iron content and the low-grade ores range mostly below 25 pct iron content.

Because of the lack of good domestic ores, the German steel industry for many years relied on imports for the greater proportion of iron ore requirements, principally from Sweden and France. In 1938, almost 9,000,000 tons of ore, containing 5,500,000 tons of iron, or approximately 50 pct of Germany's iron requirements that were imported, came from Sweden. In the same year about 5,000,000 tons of ore, containing about 1,700,000 tons of iron, or about one-sixth of Germany's iron requirements that were imported, came from France. Other substantial amounts were imported from Norway, Luxemburg, Spain and North Africa.

This dependence on imported ore placed German iron and steel industry in a poor strategic position so in 1936 the government fostered a campaign to re-open old mines, to develop new ones and to build stock piles of rich imported ores. This was uneconomical for the private companies and the plan did not make much progress, although by the outbreak of the war the Ruhr plants had built their stock piles of foreign ore to an average of nine months' consumption. As a result the government formed the Reichswerke Hermann Goering to exploit the large, low-grade deposits at Salzgitter.

During the progress of the war, however, it was possible to continue heavy iron ore shipments from Scandinavia. In 1940, through occupation of the countries, Germany secured the Lorraine-Luxemburg Minette ore deposits, and those sources made good any deficiencies from other countries. Thus, Germany suffered no shortage of foreign ore. Aside from the Saar, which uses large amounts of Minette ore, the only other district consuming appreciable quantities of imported ore is the Ruhr.

No Shortage of Scrap

Germany has always been almost completely self-sufficient in scrap, and during the four years before 1938 imported less than 5 pct of her requirements. These imports came almost entirely from the adjacent territories of France, Belgium, and Luxemburg, which had excess supplies because their steel industries, being predominately Thomas steel producers, were only limited scrap consumers. In 1938 and 1939, however, in line with Germany's stock piling policy, substantial amounts of scrap were purchased from the United States. During the war, scrap was imported from the over-run areas of Russia and Western Europe but this was only a minor part of the total scrap picture.

The amount of scrap consumed in Germany does not indicate any tightness of supply during the war period. In the case of blast furnace scrap the ratio of scrap charged to pig iron produced actually showed a substantial increase over the prewar practice, rising from 6 pct in 1936 to 16 pct in 1944. In steelmaking furnaces, the scrap charge averaged about 36 pct throughout the war.

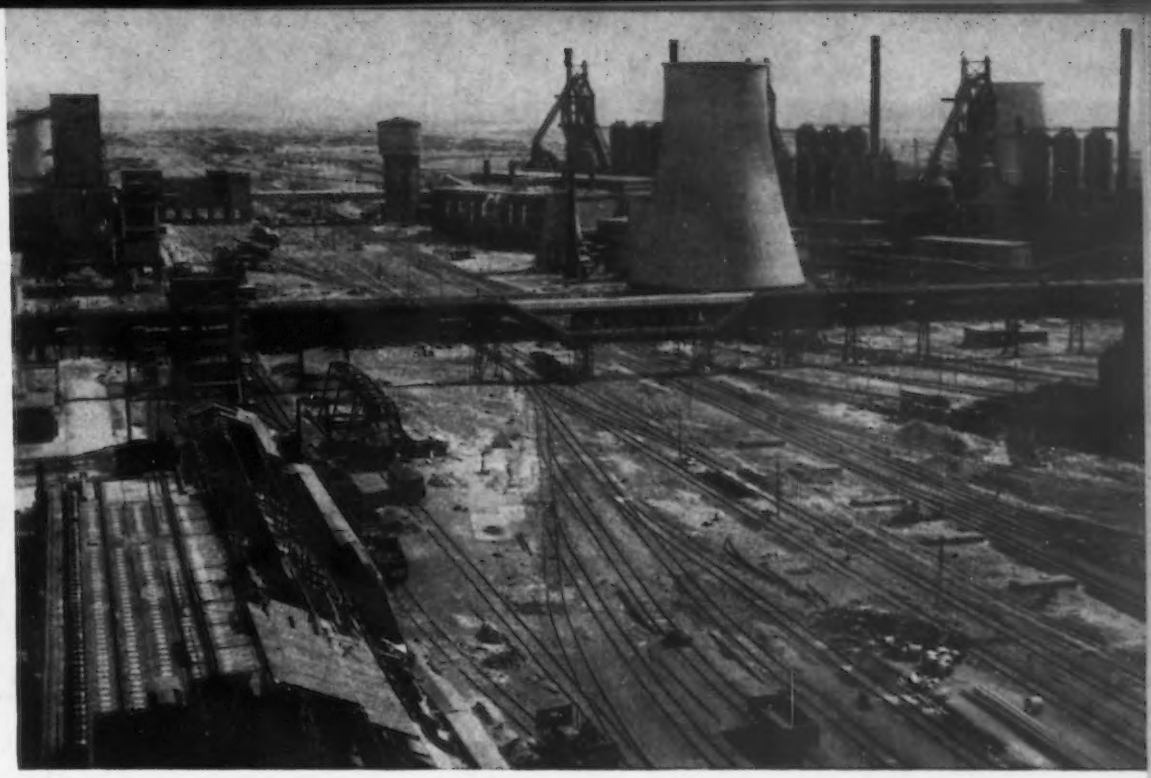
Because of the availability of the Finnish nickel deposits shipped through Petsamo, the German steel industry had no serious shortage of nickel and at the beginning of 1945 had a 10-months' stock on hand.

The German steel industry received a big stock of manganese from Nickopol, U.S.S.R. after its capture, and when it was retaken by the Russians new deposits were developed in Czechoslovakia and the Balkans. The result was no great shortage of manganese.

Limestone supplies are abundant in Germany with large deposits of dolomite and limestone located in the Northwest District only a short rail haul from the steel plants. It is used not only as a flux in the blast furnaces, but also as a refractory material in the basic steel furnaces. The Lorraine Minette and the Ilseder ores are self-fluxing. No limestone problems were experienced during the war.

Few Technical Innovations

There were actually few technical practices in German industry of value to American steel producers. German production, of course, is based on the Thomas converter, which supplies large quantities of blown steel to the rolling mills. Openhearth output is based on duplexing from the Thomas converter and the blast furnace. Practically all German steelplants have closely integrated groups of blast furnaces, converters, and open hearths, and it was this intimate integration that theoretically made the industry quite vulnerable to air attack. For, damage to one unit would seriously interfere with production throughout the plant. This was amply illustrated in one large plant in the Essen area where an accidental direct bomb hit on a bridge of the hot metal highline stopped plant production for three weeks. Merchant iron was sand



GENERAL view of one section of the Hermann Goering works, with several of the blast furnaces and stoves in the distance. Instead of wooden sheathing on cooling towers this plant used a 2-in. thick reinforced concrete sheathing, as shown on the cooling tower, foreground. A complex system of elevated superhighways serviced the entire plant area, one section of the highway being shown here.

cast, and in fact there is only one pig casting machine in all Germany, a new unit barely in operation at the Hermann Goering plant.

In Germany ingot pouring is carried out one bay away from the pit side of the furnaces. In the building bay at the pit side, all ingot mold preparation and openhearth end rebuilding is carried out, and this space also serves as a mold storage area. It is believed that this arrangement results in a number of production advantages.

In all German plants there is a surprisingly large number of cranes and charging equipment. Openhearths are serviced by almost one charger for each furnace, the charger being usually of the merry-go-round type. In Germany's best alloy plant, the Deutsche Edelstahlwerke, at Krefeld, there were three 30-ton basic open hearths, two with suspended Radex roofs and one with a silica roof. There were two 6-ton induction electric furnaces, and 10 arc furnaces of sizes ranging from ½ ton to 25 tons. The small electrics are charged by troughs or by hand, and the large electric furnaces are charged by Demag basket-type top chargers. The shells are stationary on their trunnions, the bridge with its electrodes moving on wheels towards the pits.

The 30-ton open hearth roof brick in this plant are 18 in. overall, with a 3 in. leader. About 550 to 800 heats are averaged before the first patching of the burner bricks. The roof, back wall, front and side walls are Radex down to the slag pockets. There is then one course of chrome brick, and silica brick the rest of the way. The bottoms are three or four courses of magnesite brick, the rest being plastic, chrome, magnesite mixture rammed into place similar to Ramix. There are no fan tails. Radex inserts are used to fill in on the top of the roof brick. The openhearth furnace was 42 ft. overall by 15 ft 10 in. wide at the floor line, and 8 ft high above the floor. The furnace proper on the hearth was 28 ft long, ports at each end being 7 ft long, height of the knuckle was 7 ft 4 in., height to the furnace doors 24 in., there being three furnace doors. The brick wall slopes at approximately a 30° angle, springs being used on the back wall.

Some of the ingot molds were approximately 48 in. long, 23 in. OD with a 15-in. tapered hole. The vast majority of ingots at this plant weighed 1 ton; almost 1700 lb going into the body of the ingot, the remainder being sinkhead. A fibre-brick cupped plug is used in the bottom of these molds. The hot top consisted of a welded 16-gage band lined with plastic clay, the middle being formed of clay brick sections. With patching the life averaged 10 to 12 pours. Dimensions were 22 in. OD, 8 in. ID, 14 in. high. The ingots were removed from the mold by putting a chain around the sinkhead, there being no stripper cranes in this plant.

Checkers were built halfway down of silica brick, the balance being clay brick. There was a total of 36 courses, 15 ft deep. After 500 to 800 heats the checkers received their first repairs, at which time approximately 30 pct of the silica brick and none of the clay brick were replaced. Weights on a rope were used to clean the checker.

Plant records indicated that the Radex brick can stand 180°F more than the silica brick, although it should be noted that the silica brick quality in Germany deteriorated during the war. With good silica brick and good operators roof life averaged 400 heats with silica brick.

For those interested in blast furnace operation, the typical practice at one of the Krupp plants, the Frederick Alfred Hutte, at Rheinhausen, might be of interest. Five of the furnaces have McKee tops, two have straight tops, and two others have Brassert oscillating tops. Coke rate for Thomas iron was 1700 to 1900 lb per net ton, coke rate for openhearth iron was 2300 to 2500 lb per ton. Coke rate on 50 pct scrap ranged from 1600 to 1700 lb per net ton. Up to 1934, 10 to 15 pct scrap was used in the blast furnaces, but since that time various amounts as high to 50 pct had been used. Stone per ton of pig iron averaged 5 to 7 pct. Fe recovery was 90 pct. When using 50 pct scrap the practice was to charge some 4180 lb of 28 pct ore per ton of pig iron. Charging up to 28 pct sinter improved the coke rate, but there was no significant change in coke for sinter over 30 pct. Normal sinter practice was 30 pct, but charges as high as 70 pct sinter were not uncommon.

Roll scale was not used in the sinter, but the roll scale was used for oxidation instead of ore. They had run as high as 82 pct flue dust on sinter but did not recommend this practice. The Fe in the flue dust was 40

pct. During the war the flue dust ran to about 6 pct of the pig iron, but the normal prewar practice averaged 1½ to 2 pct. Salzgitter and Lahn ores were benefited by the Lurgi method in a reverberating kiln, and there was 90 pct recovery from the ore. The effect of the scrap was so severe on the linings that this particular plant was building cupolas to handle scrap. The wind temperature for Thomas iron was 1100°F, and for openhearth iron the temperature was 1380° to 1470°F, and top temperature was 300° to 480°F. The tops were water cooled.

The practice was to desulphurize by using aluminum in the blast furnace, keeping the Al_2O_3 from 14 to 18 pct in the slag. Bauxite waste was used as a source of aluminum, and this practice permitted a guarantee a maximum sulphur of 0.02 pct. Three slag analyses were made each day. About 6.5 ft above the slag hole and 3 ft above the bosch there were holes in the blast furnace to drain off liquid KCn with NaCn as an impurity. The carbon in the coke varied from 75 to 96 pct, due to the varying ash content. Potassium cyanide was sold for fertilizer. About 3,600,000 cu ft of wind per hr was blown for each large blast furnace from a common header, and for the smaller blast furnaces the blow was 1400 to 1800 cu ft per hr, from the same header. Furnace top pressure was 12 in., after the disintegrators the pressure was 8 in., and after the stoves the pressure was 4 in. The dust content was 0.003 g per cu m. Ballast was made from the blast furnace slag, and some 4,000,000 bricks per month were manufactured from blast furnace slag. These bricks are used the same as conventional house bricks both for plant construction and for commercial building. The waste heat from the gas engines was used for hardening the brick, the CO_2 content making an exceptionally good hardener. These bricks get harder with age, and the white slag is aged and used as a binder.

The blast furnaces were tapped every 32 hr, and during the year 1944 each blast furnace was banked less than 20 times, for the most part because of wartime operational difficulties.

This plant, like all other German plants, had its Thomas converters completely shrouded as a black-out precaution. The dust that was so trapped and fell back was processed to remove the vanadium content. The uncomfortable aspect of working in this particular confined area can well be imagined. In some plants this vanadium-rich dust was smelted together with siliceous Minette ores in a small blast furnace, the liquid iron being passed through a Frisch-Trommel unit to form a slag rich in V_2O_5. This slag was fused with soda ash and leached with water to extract sodium vanadate. The yield of vanadium from slag to metal or oxide was about 70 pct. The converters got 350 blows on a lining, and used 180-needle tuyères.

In the openhearth division of this plant, near the war's end the time on heats increased from 11½ to 17½ hr due to air raid alarms and alerts. They used two ladles for each charge, one ladle being 80 ton and the other ladle 40 ton. The average heat rate was 1,125,000 calories per ton, and producer gas was preferred to coke oven gas due to the luminous flame. About 75,000 tons of crude steel were obtained on the straight-flue checkers. The plant had two 75-ton mixers.

The largest independent steel producer in Germany was Gutehoffnungshutte, near Essen. All operations at this plant followed the usual German pattern, the only novelty being a continuous pan-type Greenawalt sintering unit, having a capacity of 1200 tons per day. This is a Swedish patent modification of the Greenawalt method, and the company was most enthusiastic as regards its performance.

The records of this same plant indicated that they got 8 to 10 heats on hot tops, and 12 to 14 heats on ladles. They desulphurized metal at both the blast furnaces and mixers. This same plant had a practice of fastening aluminum on the end of openhearth stopper rods, then fastening the stopper rods onto the tongs of the stripper, placing this assembly into the ladle and revolving the tongs. The operators at this plant insisted that Radex roofs gave them no longer life than silica, and only used the former for special steel castings.

The most efficient and cleverly operated steel plant in all Germany was Bochumer Verein, at Bochum, near Essen. This was a member plant of the (the equivalent of U. S. Steel Corp. in Germany) Vereinigte Stahlwerke, and was the sixth largest steel producer in the Reich. Whereas popular fancy credits Krupp as being the prime producer of ordnance in Germany, the true fact is that this Bochum plant is by far the largest heavy ordnance source, and one unit casts the largest steel foundry pieces on the European continent. Popular pressure made bombing of the Krupp works in Essen a must, whereas this most desirable target only a few miles away was practically ignored during the entire war.

Dr. Poesche, the steelworks director at this plant, is probably the most clever technician in all Germany, and his plant is an excellent example of how the influence of one man can be reflected throughout an entire steelmaking complex.

This plant was a red-hot Nazi outfit, but a few days after capture the officials were considerably subdued. Whereas, under the Versailles Treaty, the armament equipment of this plant was destroyed by order of the Inter-Allied Commission, it secretly and under Hitler defiantly equipped itself for the war program. For example, a 160-ft tower was built and, as camouflage, was equipped with tensile-testing equipment for full-length beams and rails, etc., and later emerged as a vertical heat treating and quenching tower for large gun forgings.

In the openhearths, this plant, like many others in Germany, laid front-wall brick at an angle, thus minimizing brick damage during charging.

The openhearth layout was particularly efficient, being clean in lines, highly mechanized, with most of the operations controlled by one man in a control pulpit. There was a scrap yard building, furnace building, pit building, a pouring building, a mold-conditioning building and a lime-storage building, all side by side. Ferroalloys, lime, and other charge materials came onto the open hearth floor from these buildings in buckets suspended from a monorail system. The openhearth floor was controlled for the most part by one man from a compact pulpit.

There were two, 120-ton tilting openhearths, two 180-ton tilting openhearths and one 350-ton tilting openhearth. The practice was to pour from one furnace into several ladles, and 32 ingots were bottom poured from a single fountain. The ingots were from 4 in. square to 28 in. square. Furnaces were approximately 70 ft long. There were four merry-go-round chargers, almost one for each furnace.

This plant had seven lathes for turning square ingots. In one ordnance building in this plant the cranes were operated from the floor, there being approximately 150 bus cars under the roof trusses.

The Hoesch Steel Works, Dortmund, was conventional and not very interesting. One feature of moment was that a Steckel hot mill operated here, producing about 5000 tons a month. The ingots for the hot Steckel were crowned, the purpose being to eliminate fishtails, and the largest ingot rolled was 3½ tons. The openhearth silica roof life ran up to 400 heats, the bulkheads being chrome.

At the Rochling works at Volklingen in the Saar there is another hot Steckel mill, this being a German patented design but obviously similar to U. S. units. It has two 4-high stands of the normal type, electrically driven, with 4-ft roll barrels.

The Hermann Goering plant at Salzgitter, near Braunschweig, was an entirely war-built unit. It looks very American as it should since it was built by Brassert. Money was squandered without question on this plant, and it is by far the most modern and lavishly equipped in Europe, and in fact only several plants in the United States could compare physically with it. It was still under construction when captured, although some units had operated for several years. It's in the British zone of control, it's too modern a plant to permit the Germans to retain, and it is the type of plant the Russians would understandingly covet as a reparations payment.

At the Hermann Goering plant there were 12 blast furnaces already built and four more under construction, three openhearths, two electric furnaces and six Thomas converters. The power house was a man-size unit, having six 60,000-kva, 10,000-v, 45,000 kw, and two 12,500 kva, 6,000-v turbogenerators.

The blast furnaces were of a size to compare with American 1200-ton units, but produced only 540 tons per day on low-grade ores and 750 tons on high-grade ores. Eight of the blast furnaces were constructed 90 ft high, with 20-ft hearths and 23 ft 4 in. bosch. The last two furnaces were being changed to 24 ft 2 in. hearth and 27 ft 6 in. bosch. This plant had six Dwight-Lloyd sintering lines with a capacity of 1200 tons each, daily. There were 14 Salem circular pits, 12 of which had been completed and two in the process of construction. All had waste heat boilers. Rolling equipment was conventional, one plate mill having been brought intact from a Holland plant.

Coke manufacture in Germany followed conventional practice, the equipment frequently being far less modern than in comparable American installations. At the Rochling plant in the Saar, however, the Still process deserves attention.

It is well known that the quality of the gas made in the coke oven changes over the period of heating.

The gas evolved during the first few hours is richer in unsaturated hydrocarbons and aliphatics than during the later period, due to the fact that the distillation gases from the centre of the charge must pass through a layer of red-hot coke and over hot brickwork on their way out to the hydraulic main and a considerable degree of cracking of the hydrocarbons occurs. To overcome this, a method was derived by Dr. Still to operate the ovens with a central withdrawal pipe for the gas.

When the oven is charged with coal, a series of holes are drilled through the charging holes vertically, along the middle axis, to within about 18 in. of the oven sole. Into each of these holes a pipe is inserted penetrating about 18 in. below the surface of the coal. These pipes are subject to a suction of 12 in. w.g.

The time of heating the oven charge is 18 hr.

The gas for the first 4 hr of heating, which is withdrawn in the normal manner from the upper part of the oven, is mixed in one hydraulic main and cooling system with the gas which is withdrawn during the first 10 to 12 hr from the central pipes. This is termed E gas.

The gas from the upper part of the oven for hours 5 to 18, and that from the central pipes, hours 13 to 18, are collected separately and termed A gas.

The A gas is cooled and treated in the normal manner for recovery of byproducts and has a calorific value of 4250 cal per cu m.

The E gas is rich in the higher hydrocarbons, and high in sulphuretted hydrogen and is treated in a separate system. The gas is:

(1) Cooled for removal of tar. This tar is rich in phenols, oils (15 pct aliphatics) and contains about 30 pct pitch.

(2) Washed with water to remove NH_3 and H_2S.

(3) Desulphurized with iron oxide.

(4) Compressed to 9 atmospheres and washed with special wash oil (b.pt. 160° to 390°F) to remove propane, butane and light benzines.

(5) Washed with normal wash oil to remove benzol.

(6) Gas is reserved for use in the openhearths and has a calorific value of 4800 to 5000 cal per cu m.

This gas was used cold, mixed with tar of road quality (60-65 pct pitch, 30 pct oil) in the openhearths and gave excellent hot-working conditions.

Hydrogen and Oxygen Contents of Welds

CONSIDERABLE study of the welding of high-tensile steels in recent years has indicated that cracking may occur in the hardened zones of the base plate immediately adjacent to the weld. It has been shown by several investigators that certain types of weld metal, including highly oxidized ferritic types and austenitic weld metal, are largely immune from this cracking tendency. It has also been shown more recently that this may be related to the diffusible hydrogen content of the weld metal.

In a paper by L. Reeve before the Iron & Steel Institute, London, there is discussed the critical relationship between the FeO of weld metal and its total and diffusible hydrogen content.

It is shown experimentally that the total hydrogen content is slightly reduced, whereas the diffusible hydrogen content is considerably reduced, when the FeO content in the weld is increased. An attempt is made to explain these results theoretically on the basis of the data reported by Chipman (Transactions of AIME, 1937, vol. 125, pp. 331-345) for the system Fe-FeO-H_2-H_2O at temperatures above the melting point of iron, and from a discussion of the probably behavior of the hydrogen in solution after solidification of the weld.

The influence of microcavities and of inclusions is discussed, with particular reference to the influence of the active FeO content of the inclusions. It is confirmed that the baking of an electrode at 660°F will reduce the hydrogen content in the resultant weld, but attention is drawn to the simultaneous change in the oxygen content which may occur.

German Stainless Steels

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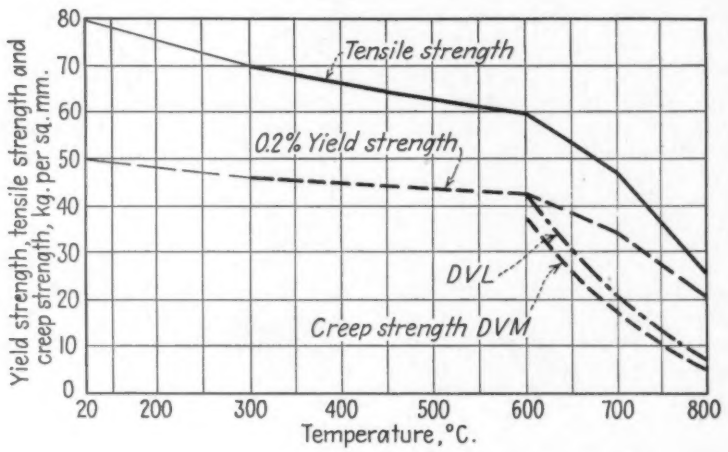
... Scarcity of alloying agents such as molybdenum, nickel and columbium led to the development of heat-resistant stainless steels of lower alloying content or the replacement of strategic alloying elements with manganese, titanium and vanadium. Aluminum was also extensively used as an alloying element in the straight chromium type of heat resisting steels. In this article, data on the properties, applications and methods of processing and heat treating the various types of stainless steels and high-temperature alloys commercially produced in Germany during the war are presented.

A SUBSTANTIALLY complete picture of the types of stainless steels and high-temperature alloys commercially produced in Germany during the critical period of World War II is presented herein in condensed tabular form, as well as information on their properties, uses and methods of processing and heat treatment. The information in question represents nothing more than a simple reproduction after the necessary translation from German to English of certain data sheets secured by the writer from the technical staff of the Fried. Krupp Co. at Essen during April 1945, while serving as scientific consultant for the Technical Industrial Intelligence Committee of the Foreign Economic Administration and as a member of a CIOS team operating under the Supreme Headquarters of the Allied Expeditionary Forces (SHAEF).

Table I represents Work Sheet VDEh-470 issued in January 1945, under the authority of the Reichsminister for Armaments and War Production, and contains detailed information on eight wrought heat-resisting steels including their chemical compositions, mechanical and physical properties, as well as information on the chemical composition of the ap-

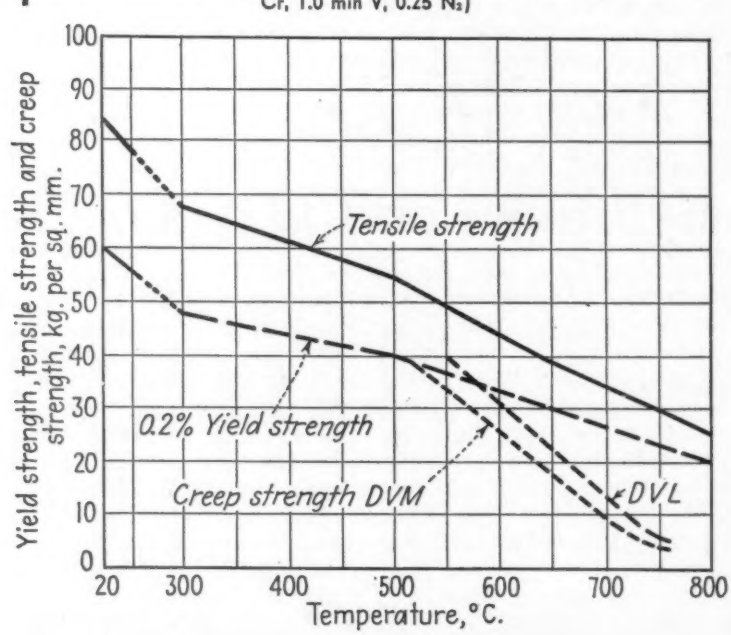


ABOVE

FIG. 1—Physical properties of the high strength, high temperature steel, Tinidur. (O.10 C, 30 Ni, 15 Cr, 1.8 min Ti)

BELOW

FIG. 2—Physical properties of Cromadur (CMV Special). (18 Mn, 12.5 Cr, 1.0 min V, 0.25 N_2)



propriate welding rod to be used in connection with the fabrication of these particular wrought heat-resistant steels. Table II represents Work Sheet VDEh-471 issued in January 1945, which is of similar nature except that it relates to seven cast steels of the heat-resistant type.

Work Sheets VDEh-470 and 471 were obtained at the Krupp plant in regular printed form.

The work sheets which are reproduced as tables V, VI and VII were in the original manuscript form ready for printing. It was explained by a member of the Krupp technical staff that the initial printing of these particular work sheets was interrupted by the Allied advance which resulted in the capture of the Ruhr pocket including Essen shortly before the writer's arrival. Table III refers to six grades of stainless and acid-resistant cast steels, table IV to 16 grades of wrought stainless steels, and table V to the fields of application of 27 grades of wrought stainless steels.

It is to be noted that tables VI and VII refer respectively to two special high-temperature alloys designated as Tinidur and CMV Special (Cromadur), and that figs. 1 and 2 show in

TABLE I

Heat-Resistant Rolled and Forged Steels

This list embraces those rolled and forged steels which are distinguished at temperatures above 600°C (1112°F) by high resistance to scaling and in part by high strength. These steels are free from phase transformation and have a ferritic or austenitic structure.

Description of Steel	Material Number	4713	4715	4724	4719	4762	4801	4828	4841
	Steel Class	A 3	A 3	A 5	A 11	A 9	F 1	C 8	C 16
	Identification Mark	8 CrAl 27	8 CrSiAl 24	10 CrSiAl 52	7 CrAlTi 32	12 CrAl 96	10 MnCr 72	15 CrNiSi 38	15 CrNi 96 76
	Other Designations	1510 StCrSi 6		1515 StCrSi 13	StCrAl 7	StCrSi 25	1438		
Average Chemical Composition (Approximate) Pct	C	0.12 Max	0.12 Max	0.12 Max	0.10 Max	0.15 Max	0.15 Max	0.15	0.15
	Si	1.0 Max	1.5 Max	1.5 Max	0.8 Max	1.5 Max	3.0 Max	2.0	2.0
	Mn	0.3 Max	0.3 Max	0.3 Max	0.3 Max	0.3 Max	18.0 Max	0.3	0.5
	Al	0.5 Max	1.0 Max	1.0 Max	6.0 Max	1.5 Max	—	—	—
	Cr	6.5 Max	6.0 Max	13.0 Max	8.0 Max	24.0 Max	9.0 Max	19.5	24.0
	Ni	—	—	—	—	—	1.8 Max	9.5	19.0
	Ti	—	—	—	1.0 Max	—	—	—	—
Range of Application in Air (1)	Temperature in °C	Up to 800	Up to 900	Up to 1000	Up to 1100	Up to 1200	Up to 900	Up to 1050	Up to 1200
Heat Treatment	Annealing or Quenching Temperature °C	750 to 850	750 to 850	750 to 800	750 to 780	800 to 850	1050 to 1100	1050 to 1100	1050 to 1100
	Method of Cooling	Air	Air	Air	Water	Air or Water	Water	Water	Water
Structure after Heat Treatment		Ferritic Perlitic	Ferritic	Ferritic	Ferritic	Ferritic	Austenitic	Austenitic	Austenitic
Mechanical Properties at Room Temperature	Yield Strength in Kg per Sq Mm	25 Min	30 Min	35 Min	40 Min	40 Min	30 Min	30 Min	30 Min
	Ultimate Tensile Strength in Kg per Sq Mm	45 to 60	50 to 70	50 to 70	55 to 75	50 to 70	65 to 80	60 to 75	60 to 75
	Pct Elongation (L=5D)	20 Min	15 Min	12 Min	5 Min	10 Min	40 Min	40 Min	40 Min
Load Carrying Capacity[2] Kg per Sq Mm	600° C	2.0	2.0	3.5	—	—	12.0	10.0	10.0
	700° C	0.5	0.5	1.0	—	—	5.0	4.5	4.5
	800° C	0.1	0.1	0.4	0.8	0.4	1.7	2.0	2.0
	900° C	—	0.02	0.15	0.25	0.15	0.7	0.9	0.9
	1000° C	—	—	0.05	0.10	0.05	—	0.4	0.4
	1100° C	—	—	—	0.03	0.03	—	0.15	0.15
	1200° C	—	—	—	—	—	—	—	0.05
Mean Coefficient of Linear Expansion x 10^{-6} per °C	Between 20° C and 400° C	12.5	12.5	12.5	13.5	12.0	19.5	17.5	16.5
	800° C	13.0	13.0	13.5	15.5	13.5	21.5	18.5	17.5
	1000° C	—	—	14.5	16.5	1.45	—	19.5	18.0
Thermal Conductivity at 20° C in C.G.S. Units		0.045	0.045	0.045	0.030	0.040	0.030	0.035	0.035
Electrical Resistance at 20° C in M Ohms-Cm		90	90	90	122	110	85	88	90
Density gram per Cc		7.7	7.7	7.7	7.2	7.6	7.7	7.9	7.9

Magnetic Behavior in "As Received" Condition		Magnetic			Non-Magnetic	
Weld Rod Material	Material Number	4716	4723	4772	4828	4842
	Steel Class	A 4	A 5	A 10	C 8	C 16
	Identification Mark	7 Cr 36	10 CrSi 52	12 Cr 116	15 CrNiSi 38	13 CrNi 96 78
	Other Designations	1511	1516			
Average Chemical Composition (Approximate)	C, pct	0.10 Max	0.15 Max	0.15 Max	0.15	0.15
	Si, pct	0.7 Max	2.5 Max	1.3 Max	2.0	1.1
	Mn, pct	0.3 Max	0.3 Max	0.3 Max	0.3	2.2
	Cr, pct	9.0 Max	13.0 Max	29.0 Max	19.5	24.0
	Ni, pct	—	—	—	9.5	19.5

[1] At the temperature X° a steel is still considered heat-resistant if its scaling loss on the average does not exceed 1 gram per hr per sq m, and if at a temperature X + 50° the scaling loss on the average is less than 2 gram per hr per sq m. In the presence of corrosive gases the permissible service limit may be lower.

[2] Under a load giving a maximum permanent extension of 1 pct in 1000 hr.

graph form certain data obtained in these two tables respectively. While tables I to V, inclusive, relate to stainless and high-temperature alloys produced by the entire German steel industry, the Tinidur and Cromadur alloys described in tables VI and VII as well as figs. 1 and 2, respectively, were developed by the Krupp Co. specifically for use as blading material for the gas turbine of the Junkers 004 Jumo jet-plane. It is understood that a different alloy was used for the same purpose in another type of jet-plane turbine manufactured by the Bavarian Motor Works.

In the present report it is not the intention of the writer to discuss the German stainless steels and high-temperature alloys described in the tables, nor to compare them with corresponding materials used in the United States for similar war purposes. An entire book could be written on this subject alone because of the very interesting manner in which the German alloys differ from those

TABLE II

Heat-Resistant Cast Steels

This List Embraces Those Cast Steels Which Are Distinguished at Temperatures Above 600°C by High-Resistance to Scaling and in Part by High Strength.

Description of Steel	Material Number	4702	4712	4731	4776	4719	4828	4846
	Steel Class	A 1	A 3	A 5	A 10	A 11	C 6	C 19
	Identification Mark	G 25 SiCr 13	G 25 CrSi 24	G 60 CrSi 52	G 120 Cr 112	G 10 CrAlTi 32 22	G 40 CrNi 88 38	G 40 CrNi 104 56
	Other Designations							
Average Chemical Composition (Approximate) Pct	C	0.25	0.25	0.6	0.6	0.15	—	0.4
	Si	3.25	2.5	2.5	2.0	0.75	—	2.0
	Mn	0.4	0.4	0.4	0.4	0.4	—	0.5
	Al	—	—	—	—	6.0	—	—
	Cr	3.0	6.0	13.0	28.0	8.0	22.0	26.0
	Ni	—	—	—	—	—	9.5	14.0
	Ti	—	—	—	—	0.85	—	—
Range of Application in Air [1]	Temperature in °C	Up to 850	Up to 900	Up to 950	Up to 1150	Up to 1100	Up to 1000	Up to 1150
Heat Treatment	Annealing or Quenching Temperature, °C	Not Heat Treated [2]	Not Heat Treated [2]	Not Heat Treated [2]	Not Heat Treated [2]	750 to 780	1050 to 1100	1050 to 1100
	Method of Cooling	—	—	—	—	Water	Water	Water
	Structure after Heat Treatment	Ferritic Pearlitic	Ferritic Pearlitic	Ferritic Carbide	Ferritic Carbide	Ferritic	Austenitic	Austenitic
Mechanical Properties at Room Temperature	Transverse Strength in Kg per Sq Mm	70 to 80	60 to 70	60 to 70	60 to 65	20 to 30	80 to 85	80 to 85
	Deflection in Mm	8 to 10	6 to 10	10 to 12	8 to 10	2 to 4	30 to 35	25 to 30
	Brinell Hardness in Kg per Sq Mm	220 to 270	220 to 270	250 to 300	250 to 300	200 to 250	180 to 230	180 to 230
Load Capacity [3] in Kg per Sq Mm	600° C	2.5	2.5	3.0	3.0	4.0	10.0	10.0
	700° C	0.6	0.6	1.0	1.0	1.5	4.0	4.5
	800° C	0.15	0.15	0.40	0.4	0.6	1.7	2.0
	900° C	0.05	0.05	0.15	0.15	0.25	0.7	0.9
	1000° C	—	—	0.02	0.07	0.10	0.4	0.4
	1100° C	—	—	—	0.03	0.03	—	0.15
	1200° C	—	—	—	0.01	0.01	—	0.05
Mean Coefficient of Linear Expansion x 10^{-6} per °C	Between 20° C and 400° C	12.5	12.5	12.5	11.5	13.5	17.5	17.5
	800° C	13.0	13.0	13.5	14.0	15.5	18.5	18.5
	1000° C	—	—	—	16.0	16.5	19.5	19.0
Thermal Conductivity at 20° C in C.G.S. Units		0.05	0.045	0.045	0.045	0.030	0.035	0.035
Average Specific Heat Between 0° and 100° C in Calories per Gram per °C		0.12	0.12	0.12	0.12	0.12	0.12	0.12
Density Grams per Cc		7.7	7.7	7.7	7.5	7.2	7.9	7.9
Shrinkage in Pct		1.5 to 2	1.5 to 2	1.5 to 2	1.5 to 2	1.5 to 2	2.5	2.5

Magnetic Behavior		Magnetic		Non-Magnetic	
Weld Rod Material	Material Number	4723	4772	4828	4842
	Steel Class	A 5	A 10	C 8	C 16
	Identification Mark	10 CrSi 52	12 Cr 116	15 CrNiSi 38	15 CrNi 96 78
	Other Designations	1516			
Average Chemical Composition (Approximate) Pct	C	0.15 Max	0.15 Max	0.15	0.15
	Si	2.5 Max	1.3 Max	2.0	1.1
	Mn	0.3 Max	0.3 Max	0.3	2.2
	Cr	13.0 Max	29.0 Max	19.5	24.0
	Ni	—	—	9.5	19.5

[1] At the temperature X° a steel is still considered heat-resistant if its scaling loss on the average does not exceed 1 gram per hr per sq m, and if at temperature X + 50° a scaling loss on the average is less than 2 grams per hr per sq m. In the presence of corrosive gases the permissible service limit may be lower.
[2] For machining and stress relieving large castings are annealed around 700°C.
[3] Under a load giving a maximum permanent extension of 1 pct in 1000 hr.

with which we are more familiar here. Of course, a number of these German steels are very similar if not identical with grades produced in the United States, but there are numerous deviations from what we consider normal composition and in addition there are numerous alloys which have not been commercially produced in this country.

Scarce Elements Replaced

In some instances the selection of chemical composition was undoubtedly dictated by the scarcity economy factor in Germany during the war period, particularly toward its end. For example, Cromadur which is a manganese-chromium-nitrogen alloy, was to have displaced the high-nickel (30 pct) Tinidur as jet-plane blading material, presumably because of a shortage of nickel. To what extent Cromadur was used commercially could not be reliably ascertained. It is to be noted that its creep strength was slightly inferior to that of Tinidur. Incidentally, it was gathered in conversation with the technicians at Krupp that the introduction of nitrogen in Cromadur represented quite a difficult problem.

It should be noted here in passing that the turbine wheel of the Junkers jet-plane was made from a low-alloy heat-treatable grade FK(D)M10 analyzing 0.25 pct carbon, 3 pct chromium, 0.4 pct tungsten, 0.4 pct molybdenum, 0.2 pct vanadium. At a later date the tungsten was omitted and this modified grade was known as FKM10. At a still later date the wheel was produced from a steel analyzing 0.30 pct to 0.40 pct carbon, 1 pct chromium and 0.20 pct vanadium which was known as grade CM25. The sheet metal used in the combustion chamber and elsewhere in the jet-plane was ordinary low-carbon steel either chromized or aluminized. The chromizing was done by treatment with chromous chloride in vapor phase. The aluminizing apparently was conducted by spraying aluminum from a special spray gun produced by Krause in Vienna, followed by dipping in a molten aluminum bath for 3 min at 850°C (1562°F). A diffusion treatment was applied after the dipping operation. The diffusion was effected by treating for 4 hr at 1000° to 1050°C (1832° to 2732°F). It was claimed that aluminizing rendered the material resistant to oxidation up to 950°C (1742°F).

While no attempt will be made to discuss these German steels in the present article, it is immediately obvious that one of the outstanding characteristics of these steels as a class is the extensive use of aluminum as an alloying element in the straight-chromium type of heat-resisting steels. These aluminum-containing straight-chromium steels are similar to the Sicromal series of heat-resistant steels which to the writer's knowledge were being produced commercially on a comparatively large commercial scale in Germany as early as 1931. It is to be noted that only one free-machining grade of steel is listed in the tables. This is shown in table IV as a member of steel class A5f and corresponds approximately to AISI Type 416 with sulfur. Attention is also called in the same table to the chromium-nickel-molybdenum austenitic

TABLE III

Stainless and Acid-Resistant Cast Steels

Steel Class	Identification Mark	Chemical Composition, Pct							Heat Treatment				Mechanical Properties at Room Temperature					
		C	Si	Mn	Cr	Ni	Mo	Ti	Condition	Annealing or Quenching Temp., °C	Method of Cooling	Tempering Temp., °C	Yield Str., Kg per Sq Mm	Tensile Str., Kg per Sq Mm	Pct Elongation (L 5D)	Transverse Stress Kg per Sq Mm	Deflection, Mm	Brinell Hardness, Kg per Sq Mm
A6L	GV5M	0.25	0.65	0.4	14.5	0.85	—	—	Tempered	975–1025	Oil	700–760	40	65–85	12	75	20	210–260
*A7Z	—	0.3	0.65	0.4	17.0	—	—	—	Tempered	975–1025	Oil	600–700	55	70–90	8	80	15	230–280
A10L	Nirosta—Cr	1.2	1.05	0.4	28.0	—	—	—	Not treated	—	—	—	—	—	—	60	10	250–300
*B6Z	Nirosta-Cr-Mo	1.2	1.05	0.4	28.0	—	1.8	—	Not treated	—	—	—	—	—	—	60	10	250–300
C5L	GV2A	0.15	1.5	0.4	18.0	8.5	—	—	Tempered	1050–1100	Water	—	20	50–70	20	60	30	140–190
D4L	GV4A	0.15	1.5	0.4	18.0	9.5	2.0	—	Tempered	1050–1100	Water	—	20	50–70	20	60	30	140–190

* These Cast Alloys are for Special Purposes

Steel Class	High Temperature Yield Strength, Kg per Sq Mm							Creep Strength Kg per Sq Mm			Shrinkage Pct	Mean Coefficient of Linear Expansion x 10^{-6} approximate				
	100°C	150°C	200°C	250°C	300°C	350°C	400°C	450°C	500°C	550°C		0°-100°C	0°-200°C	0°-300°C	0°-400°C	0°-500°C
A6L	37	36	35	34	34	32	30	13	6	3.5	2	10.5	11.0	11.0	11.5	12.0
*A7Z	52	49	46	43	40	37	35	13	6	3.5	2	10.5	10.5	11.0	11.5	11.5
A10L	—	—	—	—	—	—	—	—	—	—	1.5–2	9.5	10.0	10.5	11.0	11.5
*B6Z	—	—	—	—	—	—	—	—	—	—	1.5–2	9.5	10.0	10.5	11.0	11.5
C5L	19	17	16	15	14	13	12	—	—	—	2.5	16.5	17.5	17.5	18.5	18.5
D4L	19	17	16	15	14	13	12	—	—	—	2.5	16.5	17.5	17.5	18.5	18.5

Steel Class	Thermal Conductivity C. G. S Units Approximate	Specific Heat Calories per Gram per °C Approximate	Specific Gravity Approximate	Weld Rod Material	Magnetic Behavior
A6L	.07	0.11	7.7	C5E	Magnetic
*A7Z	.06	0.11	7.7	C5E	Magnetic
A10L	.045	0.12	7.5	C5E	Magnetic
*B6Z	.045	0.12	7.5	D4E	Magnetic
C5L	.035	0.12	7.9	C5E	Non-magnetic
D4L	.035	0.12	7.9	D4E	Non-magnetic

steels designated as C5e (V2A extra) and class D4e (V4A extra) which are stabilized by means of a titanium addition equal to at least four times the carbon content.

Since the writer's return to the United States, he has been frequently asked if the German metallurgists had devised any new stainless steels and high-temperature alloys which display properties or exhibit behavior in service decidedly superior to materials produced prior to the war. An examination of the data contained in the present report supplies the answer to this question. In the field of ordinary stainless steel applications the Germans did not develop anything of outstanding importance during World War II. The nearest approach to this objective was made in the case of the jet-plane blading alloys Tinidur and Cromadur. These are new commercial alloys so far as the writer's knowledge extends. Their mechanical properties and high temperatures are exceptionally good for a

TABLE IV—WROUGHT

Steel Class	Steel Mark	Composition, Pct								Heat Treatment		
		C	Si	Mn	Cr	Ni	Mo	S	Ti	Annealing Temperature, °C	Cooling	Tempering, °C
A5E	V13F	0.12 Max	0.45	0.30	13	—	—	—	—	750 to 800	Slow[1]	—
A5E	V13F	0.12 Max	0.45	0.30	13	—	—	—	—	950 to 1000	Oil	700 to 750
A5F	—	0.15 Max	0.45	0.30	13	—	—	.2	—	950 to 1000	Oil	550 to 600
A5G	V5M	0.2	0.45	0.30	13	—	—	—	—	930 to 980	Oil	700 to 750 650 to 700
A5H	—	0.4	0.45	0.30	13	—	—	—	—	950 to 1000	Oil/Air	—
A7E	V17F Extra	0.10 Max	0.45	0.30	17.5	—	—	—	6xC Max	800 to 850	Air	—
C4E	Vim	0.22	0.45	0.30	17	1.5	—	—	—	950 to 1000	Oil	600 to 650
C5E	V2A Supra	0.07 Max	0.45	0.30	18	9	—	—	—	1000 to 1050	Water[2]	—
C5F	V2AB Supra	0.12 Max	2.0	0.30	18	8.5	—	—	—	1000 to 1050	Water[2]	—
C5G	2VA Extra	0.12 Max	0.45	0.30	18	9	—	—	4xC Max	1020 to 1070	Water[2]	—
D3E	V8A Supra	0.07 Max	0.45	0.30	18	9.5	1.2	—	—	1050 to 1100	Water[2]	—
D3F	V8AB Supra	0.12 Max	2.0	0.30	18	9	1.2	—	—	1000 to 1050	Water[2]	—
D3G	V8A Extra	0.12 Max	0.45	0.30	18	9.5	1.2	—	4xC Max	1050 to 1100	Water[2]	—
D4E	V4A Supra	0.07 Max	0.45	0.30	18	10	2	—	—	1050 to 1100	Water[2]	—
D4F	V4AB Supra	0.12 Max	2.2	0.30	12	9.5	2	—	—	1000 to 1050	Water[2]	—
D4G	V4A Extra	0.12 Max	0.45	0.30	18	10	2	—	4xC Max	1050 to 1100	Water[2]	—

[1] Furnace cool or cool in ashes.
[2] Sheets under 1.5 mm and fine wire may be air cooled.

Steel Class	Creep Strength, Kg per Sq Mm						Mean Coefficient of Expansion x 10^{-6}				
	450°C	500°C	550°C	600°C	650°C	700°C	0°-100°C	0°-200°C	0°-300°C	0°-400°C	0°-500°C
A5E	—	—	—	—	—	—	10.5	11	11	11.5	12
A5E	—	—	—	—	—	—	10.5	11	11	11.5	12
A5F	—	—	—	—	—	—	10.5	11	11	11.5	12
A5G	*13	*6	*3.5	—	—	—	10.5	10.5	11	11.5	12
A5H	—	—	—	—	—	—	10.5	11	11	11.5	11.5
A7E	—	—	—	—	—	—	10.5	11	11.5	11.5	12
C4E	*13	*6	*3.5	—	—	—	10.5	10.5	11	11.5	11.5
C5E	—	—	—	—	—	—	16.5	17.5	17.5	18.5	18.5
C5F	—	—	—	—	—	—	*16.5	17.5	18	18.5	19
C5G	*14.5	*14	*12.5	*10	*8	*5	*16.5	17.5	17.5	18.5	18.5
D3E	—	—	—	—	—	—	*16.5	17.5	17.5	18.5	18.5
D3F	—	—	—	—	—	—	*16.5	17.5	18	*18.5	*19
D3G	*14.5	*14	*12.5	*11	*8	*5	*16.5	17.5	17.5	18.5	18.5
D4E	—	—	—	—	—	—	*16.5	17.5	17.5	18.5	18.5
D4F	*11.5	*14	*12.5	*11	*9	*6	*16.5	17.5	18	*18	*19
D4G	*14.5	*14	*12.5	*11	*9	*6	*16.5	17.5	17.5	18.5	18.5

* Exact value. Other values approximate.

ferrous alloy which does not contain cobalt. However, their mechaniical properties at high temperatures do not approach those of cast alloys of the stellite type which have been employed in this country as jet-plane blading material. Apparently, the shortcomings of these German alloys was offset in large measure by extremely clever design of the jet engine. It is known that the German jet-plane turbines were designed for only a relatively short life in service. Nevertheless, it is the writer's firm opinion that with the raw material resources at their command the German metallurgists did a remarkably good job.

Repeatedly it was stated to the writer by the Krupp technicians that in general the research and development activities of their company in the field of heat-resistant stainless steels were directed in the main toward steels of lower alloying content, that is, toward conservation of strategic alloying elements. The limi-

STAINLESS STEELS

Mechanical Properties at Room Temperature					High Temperature Yield Strength, Kg per Sq Mm						
Yield Strength, Kg per Sq Mm	Tensile Strength, Kg per Sq Mm	Pct Elongation, L=50	Brinell Kg per Sq Mm	Notch Toughness, 10 M Kg per Sq Cm	100°C	150°C	200°C	250°C	300°C	350°C	400°C
Min 30	50 to 65	Min 22	Approx. 170	Approx 12	—	—	—	—	—	—	—
45	60 to 75	20	200	12	—	—	—	—	—	—	—
45	70 to 85	12	220	—	—	—	—	—	—	—	—
45 55	65 to 80 75 to 90	19 14	220 250	10 5	42	41	40	39	38	37	35
—	180	—	530 (53 Rc)	—	—	—	—	—	—	—	—
30	45 to 60	20	160	—	—	—	—	—	—	—	—
60	80 to 95	15	260	4	52	49	46	43	40	37	35
22	55 to 70	50	160	20	17	15.5	14	13	12	11	10
30	55 to 75	40	175	15	19	17	16	15	14	13	12
27	55 to 75	40	175	15	20	18	17	16.5	16	15.5	15
22	55 to 70	45	160	20	17	15.5	14	13	12	11	10
30	55 to 75	40	175	15	19	17	16	15	13	12	12
27	55 to 75	40	175	15	21	20	19	18.5	18	17.5	17
22	55 to 70	45	160	20	17	15.5	14	13	12	11	10
30	55 to 75	35	175	15	19	17	16	15	14	13	12
27	55 to 75	40	175	15	21	20	19	18.5	18	17.5	17

Thermal Conductivity at Room Temperature, C.G.S. Units	Electrical Resistance at Room Temperature M Ohms Circular Mile	Specific Gravity	Specific Heat Calories per Gram per °C	Weld Metal Material Class
0.07	0.60	7.7	0.11	C5P
0.07	0.60	7.7	0.11	—
0.07	0.60	7.7	0.11	—
0.07	0.55	7.7	0.11	C5P
0.07	0.55	7.7	0.11	—
0.06	0.60	7.7	0.11	C5E; C5P
0.06	0.70	7.7	0.11	—
0.035	0.75	7.9	0.12	C5E; C5P
0.035	0.73	7.9	0.12	C5E; C5P
0.035	0.73	7.9	0.12	C5E; C5P
0.035	0.72	7.9	0.12	D4E
0.035	0.72	7.9	0.12	D4E
0.035	0.72	7.9	0.12	D4E
0.035	0.72	7.9	0.12	D4E
0.035	0.72	7.9	0.12	D4E
0.035	0.72	7.9	0.12	D4E

TABLE V

Application List of Corrosion-Resistant, Rolled and Forged Steels

Steel Class	Designation	Chemical Composition, Pct										Applications					Weld Rod Materia			
		C	Si	Mn	Al	Cr	Mo	N	V	W	Others	1	2	3	4	5	Heat Resistant	Corrosion Resistant	High Creep Strength	For Structural Steels-High Strength
A3	A3A	<0.12	2.5	0.3	—	6.0	—	—	—	—	(0.6 Ti)	x	–	–	–	–	x	–	–	–
	A3B	<0.12	1.5	—	1.0	6.0	—	—	—	—	—	x	–	–	–	–	–	–	–	–
	A3V	<0.12	1.0	0.3	0.5	6.5	—	—	—	—	—	x*	–	–	–	–	–	–	–	–
A4	A4P	<0.10	0.7	0.3	—	9.0	—	—	—	—	—	–	–	–	–	–	x*	–	–	–
	A4R	0.45	3.3	0.4	—	8.5	—	—	—	—	—	–	–	–	–	x	–	–	–	–
A5	A5A	<0.15	2.5	0.3	—	13.0	—	—	—	—	(0.7 Ti)	x	–	–	–	–	x	–	–	–
	A5B	<0.12	1.5	0.3	1.0	13.0	—	—	—	—	—	x	–	–	–	–	–	–	–	–
	A5E	<0.12	0.5	0.3	—	13.0	—	—	—	—	—	–	x	–	–	–	–	x	–	–
	A5F	<0.15	0.5	0.3	—	13.0	—	—	—	—	0.2 S	–	x	–	–	–	–	–	–	–
	A5G	0.2	0.5	0.3	—	13.0	—	—	—	—	—	–	x	–	–	–	–	x	–	–
	A5H	0.4	0.5	0.3	—	13.0	—	—	—	—	—	–	x	–	–	–	–	–	–	–
	A5R	2.1	0.3	0.3	—	11.5	—	—	—	—	—	–	–	–	–	x	–	–	–	–
A7	A7E	<0.1	0.5	0.3	—	17.5	—	—	—	—	>Ti 6 x % C	–	x	–	–	–	–	–	–	–
	A7V	1.0	0.5	0.3	—	17.0	—	—	—	—	—	–	x	–	–	–	–	–	–	–
A8	A80	<0.10	0.8	0.3	4.6	21.0	—	—	—	—	1.0 Ti	–	–	x	–	–	–	–	–	–
A9	A9A	<0.15	2.5	0.3	—	24.0	—	—	—	—	—	x	–	–	–	–	–	–	–	–
	A9B	<0.15	1.5	0.3	1.5	24.0	—	—	—	—	—	x	–	–	–	–	–	–	–	–
A10	A10P	<0.15	1.3	0.3	—	29.0	—	—	—	—	—	–	–	–	–	–	x	–	–	–
	A10V	<0.12	0.5	0.3	—	28.0	—	—	—	—	—	–	x*	–	–	–	–	–	–	–
A11	A11A	<0.10	0.8	0.3	5.3	8.0	—	—	—	—	1.0 Ti	x	–	x	–	–	–	–	–	–
B3	B3V	0.35	0.5	0.3	—	16.5	1.2	—	—	—	—	–	x*	–	–	–	–	–	–	–
B4	B4V	<0.10	0.5	0.3	—	16.5	1.8	—	—	—	>Ti 6 x % C	–	x*	–	–	–	–	–	–	–
B5	B5V	<0.20	0.5	0.3	—	25.0	2.5	—	—	—	1.7 Ti	–	x*	–	–	–	–	–	–	–
C3	C3T	0.13	0.5	0.3	—	30.0	—	15.0	—	—	1.7 Ti	–	–	–	x*	–	–	–	–	–
C4	C4E	0.22	0.5	0.3	—	17.0	—	1.5	—	—	—	–	x	–	–	–	–	–	–	–
C5	C5E	<0.07	0.5	0.3	—	18.0	—	9.0	—	—	—	–	x	–	–	–	–	x	–	–
	C5F	<0.12	2.0	0.3	—	18.0	—	8.5	—	—	—	–	x	–	–	–	–	–	–	–
	C5G	<0.12	0.5	0.3	—	18.0	—	9.0	—	—	>Ti 4 x % C	–	x	–	–	–	–	–	–	–
	C5P	<0.07	1.5	0.3	—	19.0	—	9.0	—	—	>Cb 10 x % C	–	–	–	–	–	–	x	–	–
	C5R	0.45	2.5	1.2	—	18.0	—	9.0	1.0	—	—	–	–	–	–	x	–	–	–	–
	C5T	0.13	0.5	0.3	—	17.5	—	10.5	1.0	—	0.6 Ti	–	–	–	x*	–	–	–	–	–
C7	C7P	<0.25	1.0	6.0	—	17.0	—	8.0	—	—	—	–	–	–	–	–	–	–	–	x
C8	C8A	0.15	2.0	0.3	—	19.5	—	9.5	—	—	—	x	–	–	–	–	x	–	–	–
C10	C10O	0.15	3.5	1.0	—	21.0	—	30.0	—	—	—	–	–	x	–	–	–	–	–	–
C16	C16A	0.15	2.0	0.5	—	24.0	—	19.0	—	—	—	x	–	x	–	–	x	–	–	–
	C16P	0.15	1.0	0.2	—	24.0	—	19.5	—	—	—	–	–	–	–	–	x	–	–	x
D1	D1V	<0.07	0.5	0.3	—	17.0	4.8	13.0	—	—	—	–	x*	–	–	–	–	x*	–	–
D2	D2T	<0.10	1.0	0.9	—	16.5	2.0	15.0	—	—	>Cb 10x%C+N_2	–	–	–	x*	–	–	–	–	–
D3	D3T	0.15	2.3	0.7	—	17.0	1.0	10.5	—	—	Cb 1.5% N_2 0.11%	–	–	–	x*	–	–	–	–	–
D4	D4E	<0.07	0.5	0.3	—	18.0	2.0	10.0	—	—	—	–	x	–	–	–	–	x	–	–
	D4F	<0.12	2.3	0.3	—	18.0	2.0	9.5	—	—	—	–	x	–	–	–	–	–	–	–
	D4G	<0.12	0.5	0.3	—	18.0	2.0	10.0	—	—	>Ti 4x%C	–	x	–	–	–	–	–	–	–
	D4V	<0.07	0.5	0.3	—	18.0	2.0	10.0	—	—	3Cb+Ti>7x% C	–	x*	–	–	–	–	x*	–	–
F1	F1A	<0.15	3.0	18.0	—	9.0	—	1.8	—	—	(0.4 Ti)	x	–	x	–	–	–	–	–	–
F2	F2R	0.4	1.8	15.5	—	12.0	—	—	—	—	—	–	–	–	–	x	–	–	–	–
	F2T	<0.10	0.5	18.0	—	12.0	—	—	0.65	—	0.20 N_2	–	–	–	x*	–	–	–	x*	–
	F2V	<0.15	0.9	18.0	—	10.5	—	—	—	—	—	–	x	–	–	–	–	–	–	–
F7	F7T	0.18	0.5	18.5	—	9.5	—	—	0.3	—	—	–	–	–	x*	–	–	–	–	–
F	—	0.35	0.6	18.0	—	3.3	—	—	—	—	—	–	–	–	–	x	–	–	–	–
E2	E2R	0.4	2.5	1.2	—	18.0	—	9.0	—	1.0	—	–	–	–	–	x	–	–	–	–
		<0.10	0.5	0.2	6.0	—	—	—	—	—	—	–	–	x	–	–	–	–	–	–

< Denotes maximum. > Denotes minimum. X* Denotes steels allocated only by agreement with the Committee on Chemical Resistant Steels.

[1] Heat-resistant rolled and forged articles.

[2] Corrosion-resistant steels.

[3] Resistance elements and heat conductors.

[4] High creep strength materials.

[5] Valve steels.

tations in the available supply of certain alloying elements made it necessary to develop grades where molybdenum, nickel and columbium were either not used or were largely replaced by manganese, titanium and vanadium where possible. Cobalt and columbium appeared to be no longer available for the production of stainless steels and high-temperature alloys.

Acknowledgments

The writer wishes to express his appreciation to the Rustless Iron & Steel Corp. for having granted the leave of absence which made possible this mission, and to his associate, F. Kenneth Bloom, assistant director, Research Div. Rustless Iron & Steel Corp., for his kind assistance in preparation of the present report.

Grateful acknowledgment is also made to those officials of the Technical Industrial Intelligence Committee of the Foreign Economic Administration both in Washington and in London for making possible the obtainment of the information contained in the present report. The writer wishes to acknowledge particularly the assistance in Washington of Howland Sargeant, Dr. A. F. Greaves-Walker, Dr. Donald Keys and Dwight Prouty, and in London to George Powell and H. C. L. Miller. The present investigation was under the immediate supervision of Dr. Robert F. Mehl, Chief of the Metals and Minerals Subcommittee of the T.I.I.C. in London. The writer wishes to thank Dr. Mehl as well as his successor, Dr. W. B. Plank.

The writer wishes to express to his CIOS team leader, Colonel Paxton-Petty of the Armaments Design Department, Fort Halstead, Sevenoaks, Kent, England, his sincere admiration for the fine qualities of courageous leadership which he displayed on this mission, and to RAF Flight Lieutenant B. G. Barnard also of our CIOS team, as well as to Gregory J. Comstock and Martin Fleischman who sojourned with the writer at Herten for a time and rendered valuable assistance.

TABLE VI
Guaranteed Properties of Tinidur

Temperature, °C	Yield Strength, Kg per Sq Mm	Tensile Strength, Kg per Sq Mm	Pct Elongation, (L=50)	Notch Impact, 1000 Kg per Sq Cm	Reduction of Area, Pct	Creep Strength Kg per Sq Mm	
						DVM[1]	DVL[2]
20	50	80-90	18	Sheet—Bar 5—Min Forgings 3—Min	20—Min	—	—
100	48	77	—	—	—	—	—
200	47	73	—	—	—	—	—
300	46	70	—	—	—	—	—
400	45	64	—	—	—	—	—
500	44	63	—	—	—	—	—
600	43	60	—	—	—	38	44
700	35	48	—	—	—	17	20
800	20	25	—	—	—	5	7.5

Forging Temperature: 1120° to 900°C
Annealing Temperature: 1000° to 1100°C—Air
Tempering: (A) 1125°C—Air, oil, furnace
(B) 750°C—Draw
Welding: (A) Electric Zeus EV*
(B) Gas Zeus GV*

Treatment after welding when possible to temper:—
Drawing is essential:—

* Reinquire before fabrication.

Coefficient of Expansion
0° to 100°C = 16.2 x 10⁻⁶
0° to 200°C = 16.3 x 10⁻⁶
0° to 300°C = 16.4 x 10⁻⁶
0° to 400°C = 16.6 x 10⁻⁶
0° to 500°C = 16.8 x 10⁻⁶

0° to 600°C = 17.3 x 10⁻⁶
0° to 700°C = 17.7 x 10⁻⁶

Modulus of Elasticity
20°C Approx. 20000 Kg per Sq Mm
00°C Approx. Kg per Sq Mm
00°C Approx. Kg per Sq Mm
600°C Approx. 16000 Kg per Sq Mm
700°C Approx. 14800 Kg per Sq Mm
800°C Approx. 13300 Kg per Sq Mm

[1] DVM—Creep rate of 0.0010 pct per hr between the 25th and 35th hr.
[2] DVL—Continuous tensile stress for 1.0 pct elongation in 300 hr.

TABLE VII
Guaranteed Properties of Chromadur

Temperature, °C	Yield Strength, Kg per Sq Mm	Tensile Strength, Kg per Sq Mm	Pct Elongation, (L=5D)	Notch Impact, 1000 Kg per Sq Cm	Reduction of Area, Pct	Creep Strength Kg per Sq Mm	
						DVM[1]	DVL[2]
20	60	85	20	4	30	—	—
300	48	68	—	—	—	—	—
500	41	55	—	—	—	41	—
550	37	50	—	—	—	34	—
600	33	44	—	—	—	26	30
650	30	39	—	—	—	18	22
700	26	34	—	—	—	10	14
750	23	30	—	—	—	4	6.5
800	20	25	—	—	—	—	—

Forging Temperature: 1060° to 900°C
Annealing Temperature: 1125°C—Water
Tempering: (A) 1100° to 1125°C—Air, oil, water furnace
(B) 750°C—Air, draw
Welding: (A) Electric Zeus EVCMVSP
(B) Gas Zeus GVCMVSP
Treatment after welding, when possible to temper:—
Drawing is essential: 750°C—Air

Coefficient of Expansion
0° to 100°C = 16.6 x 10⁻⁶
0° to 200°C = 17.5 x 10⁻⁶
0° to 300°C = 17.5 x 10⁻⁶
0° to 400°C = 18.5 x 10⁻⁶
0° to 500°C = 18.5 x 10⁻⁶
0° to 600°C

Modulus of Elasticity
20°C Approx. 20000 Kg per Sq Mm
100°C Approx. 19500 Kg per Sq Mm
200°C Approx. 19800 Kg per Sq Mm
300°X Approx. 18000 Kg per Sq Mm
400°C Approx. 17200 Kg per Sq Mm
500°C Approx. 16400 Kg per Sq Mm
600°C Approx. 15500 Kg per Sq Mm

[1] DVM—Creep rate of 0.0010 pct per hr between the 25th and 35th hr.
[2] DVL—Continuous tensile stress for 1.0 pct elongation in 300 hr.

New Equipment . . .

Small Tools

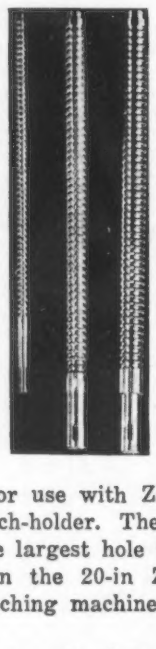
. . . Recent developments in broaches, individualized stamps, gage blocks, angle plates, diamond dressers, anchor type lock-nuts, hammers, adjustable spotfacers, die heads, slitting saws, gages, and other small tools and devices are described an illustrated herein.

THE introduction of several improvements in the Jomi torque wrench have been announced by *The Jo Mfg. Co.*, S. Gate, Calif. They have also added another wrench, Model 1600 to their line. This torque

wrench has passed all Army tests which include accuracy, drop test, oil and water immersion, and heat and cold. All moving parts pertaining to the torque control feature of the wrench are ballbearing, reducing error due to friction to the absolute minimum. Variance due to a variable friction load has been entirely eliminated, and overtightening is impossible with the wrench. Once set, it automatically breaks when the predetermined torque has been reached without the operator having to depend upon dials, clicks, or taps. The tool is set instantly by turning the guide to the desired micrometer reading on the barrel.

Broaches

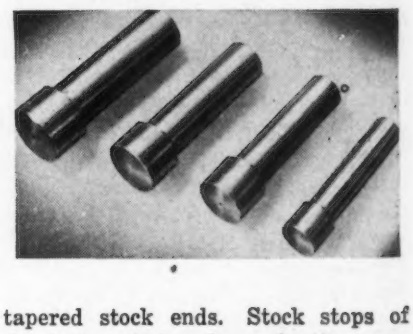
BROACHES to insure the desired results with Zagar 20-in. horizontal and 10-in. vertical hydraulic broaching machines, have been announced by *Zagar Tool, Inc.*, 23880 Lakeland Boulevard, Cleveland 17. Typical broaches shown are: (1) 6-spline broach 1½ in. diam at widest point; (2) Another conventional broach with key slots; (3) Threaded-



end type for use with Zagar quick-action broach-holder. These broaches indicate the largest hole that can be broached on the 20-in Zagar horizontal broaching machine.

Rotary Stock Stop

A ROTARY stock stop, available in four sizes for use on automatic screw machines and turret lathes, has been announced by *Barhaby Mfg. & Tool Co.*, 70 Knowlton St., Bridgeport, Conn. Compact and sturdy, these stock stops have a live head which rotates freely with the bar stock, eliminating friction between work and stop. There is no marring of the finished stock end during the feed, and greater uniformity in length of feed is obtained. In addition, it is claimed elimination of friction between stock and stop reduces wear in screw machine mechanisms, and on turret lathes it lessens operator fatigue, permitting a production increase of 7 to 15 pct. These tools are said to have no backlash and to be built to withstand hard wear and repeated impact. Regularly furnished with flat end, they also can be furnished with the rotating member made to accommodate formed or

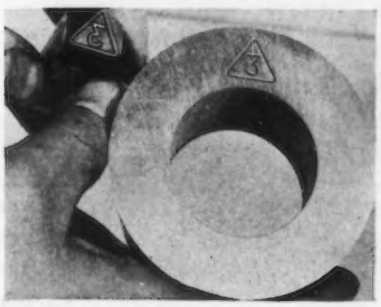


tapered stock ends. Stock stops of the latter design have floating construction to facilitate the required accuracy of alignment.

Individualized Stamps

A SPIRAL line of individualized operator's stamps designed to meet the needs of competitive peace time production conditions has been announced by *New Method Steel Stamps, Inc.*, 145 Jos. Campau, Detroit 7. Instead of carrying the usual variety of symbol designs, commonly used to identify the individual operators, the stamps are numbered from 1 to 99. The numbers are enclosed in identifying borders of varying shapes. Thus, numbers in one group are enclosed in a square, others are enclosed in a triangle, a circle or an oval. It is claimed the reason for using only 2 digit numbers is that the mark is more easily read and identified, while the large border is similarly identifiable as to shape at a glance. Use of this system is simple for the inspection department

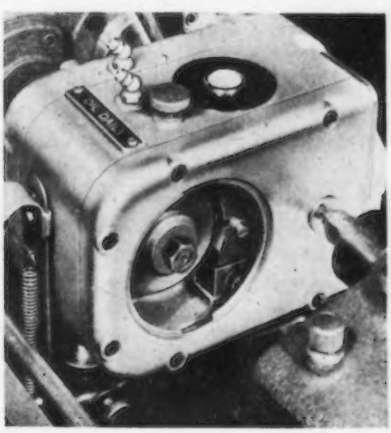
of a plant to identify any desired workman or machine from among hundreds which may be performing



identical operations on a given run of parts. The stamps are available in sets of numbers ranging from 1 up to 99 and with different border designs.

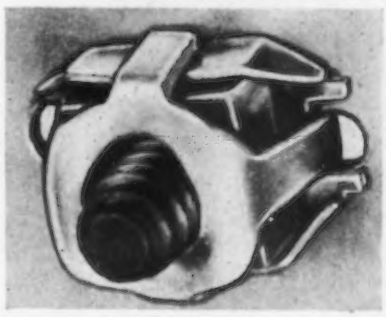
Automatic Diamond Dresser

MANY single point thread grinders can now be converted to multi-ribbed wheel work by means of the Semi-Automatic Diamond Dresser announced by *The Sheffield Corp.*, Dayton 1. This precision dressing device is recommended for use on: (a) Work demanding long lengths of thread and where the breakdown of a single point wheel necessitates making a number of passes; (b) Thread gage grinding for elimination of thick first and last threads; (c) Maintenance of minimum lead variation; (d) All fine pitch threads over 32 tpi; (e) Where the wheel is to be dressed at the required helix angle; and (f) Where it is desired to traverse grind; and the sharp corner and small radii exceed the limits of crush dressing. This dresser is claimed to make possible the use of a multi-form wheel on single point thread grinders having sufficient table space to permit its installation.



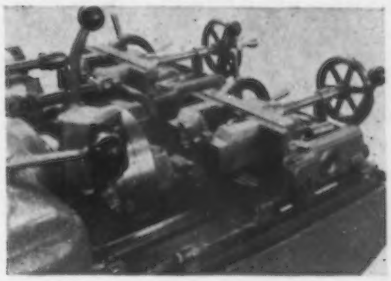
Anchor Type Lock-Nut

AN anchor type lock-nut for use on any and all sheet-metal installations where it is convenient or necessary to have the nut member held in place during assembly, has been announced by *Kaynar Mfg. Co.*, 820 E. 16th St., Los Angeles 21. It is claimed it cuts the cost of assembly of the anchor to the sheet. Formerly, anchor nuts have been riveted or spotwelded, both expensive operations as compared to the easy fastening of this device. It is removable, and in case of damage to the threads, this unit can be replaced in seconds, whereas with spotwelded or riveted types considerable time is spent for such repair. It is said to be capable of alining itself with the mating or attaching device, and may also be used anywhere where there is vibration without danger of screw shaking loose.



Work Holding Fixture

A SPECIAL work holding fixture for use with the Landmaco Threading Machine to thread hypoid driving gears and maintain the close tolerance or concentricity between the gear and the threads, has been announced by the *Landis Machine Co.*, Waynesboro, Pa. This work holding fixture comprises a traveling center, located within the bore of the head and machine spindle, combined with a splined bushing to drive the work piece, and a manually operated work center on the machine carriage combined with a cradle type support to locate the work piece for easy alignment with the work center. In operation, the work is placed on the supporting bracket and the work piece advanced with the carriage operating hand wheel until the splined end of the shaft gear engages the splined sliding bushing and center within the bore of the head. A hand wheel is then employed to advance the rear center to engage the gear end of the work. The work supporting bracket or cradle is detachable from the machine carriage front and can be interchanged with other similar brackets which may be designed to accommodate any other odd shape of work piece.



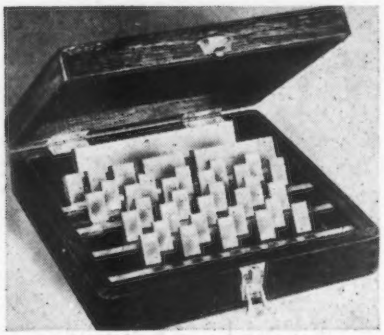
Angle Plate

A UNIVERSAL angle plate for lathe use, designed to take the place of special jigs and fixtures ordinarily required for holding irregular shaped work that cannot be chucked in the usual manner, has been announced by *Madco Products, Inc.*, 516 Fifth Ave., N. Y. One of the most all-around and practical accessories available with the angle plate is a fixture for holding plates. This device is particularly useful in machine bushing and die plates. Another accessory available, is a large V-block and clamp designed to hold rounds up to 3 in. in diam. It is attached to the base of the angle plate with T-bolts and can be positioned at any angle to facilitate the machining of eccentrics, diameters at offset angles, off center holes and multiple angle holes. The third accessory is a special indexing head which is also attached to the angle plate by means of T-bolts. It can be secured in any position on the angle plate and is particularly useful in positioning work for radially spaced machine operations.

Gage Blocks

A COMPLETE set of gage tungsten carbide blocks, meeting Bureau of Standards requirements, has been announced by *Fonda Gage Co.*, Stamford, Conn. These blocks are manufactured in sets of 35 pieces rang-

ing in size from 0.001 in. to 4.000 in. They are said to have a wear resistance at least 100 times greater than that of steel gage blocks, or 98 times greater than chrome-plated. Moreover, due to the Fonda Ultra-Finish of 0.2 to 0.4 micro-inch r.m.s., the wringing qualities of Fonda blocks are said to be far superior to those of either steel or chrome gage blocks,



and to be corrosion-proof against moisture or fingermarks.

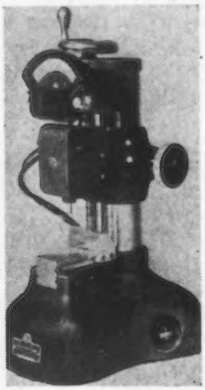
Angle Dresser

THE Bemisine Angle Dresser, a device for dressing precise angles on surface grinder wheels, has been announced by *Nicholas-Morris Corp.*, 50 Church St., New York 7. A precision-fitted sliding member carrying a diamond dressing tool is mounted on an adjustable sine-angle plate which locates on the magnetic chuck directly below the grinding wheel. A novel application of the familiar sine-bar principle is used in tilting the sine plate precisely to

the desired angle. After the desired angle is determined, the tool is brought in contact with the wheel and the slide is moved back and forth manually to generate a corresponding angle on the wheel. When not required for angle dressing, the sliding attachment can be quickly removed from the sine-angle plate leaving a working surface prepared for holding small parts at accurate angles for grinding, milling, or jig-boring operations, and in this manner the tool serves a double purpose.

Electrolimit Comparator

TO facilitate a fast and accurate means of inspecting parts, *Pratt & Whitney, Div. Niles-Bement-Pond Co.*, W. Hartford, has announced an Electrolimit Comparator. By the use of this device, a P&W electric contact unit is combined with the P&W electrolimit head to produce a unit for accurately detecting product limits. Small neon tube undersize and oversize lights are positioned at the sides of the meter, requiring only one line of vision for both the lights and the meter. The minus light on the left, being normally on, will remain



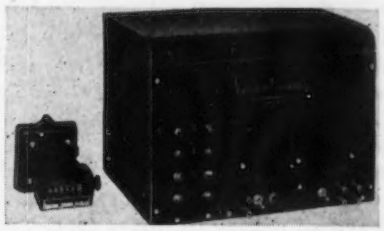
so when the part is undersize. When the part is oversize, the minus light will be turned off and the plus light on the right will flash on. When the part is within the determined limits, both lights will remain off. Should the operator desire to make an actual size reading of any part being checked, it is only necessary to slow up the high-speed gaging operation sufficiently to take the reading on the indicating meter.

Lead Hammer

UTILIZING an entirely new principle of design, a lead hammer has been announced by the *Nu Products Co.*, 1060 Broad St., Newark 2, N. J. This hand tool is said to meet a wide range of requirements. It is made of virgin tellurium lead with an antimonial content which minimizes wear and practically eliminates danger from flying chips and splinters, as the head actually toughens with use. It is claimed it will not blemish contacting metal surfaces. Shaft is doubled steel rod, cadmium plated to avoid rust, and offers extra strength by the duplicate construction. Welded cross members on both ends absorb shock and impact, thus protecting hands of user from vibration of blows. Hammer is designed for use with one or two hands.

High-Speed Counter

AN improved two-decade Electronic High-Speed Counter, designed to fill the need in fields unable to employ conventional mechanical counters has been announced by *Potter Instrument Co.*, 136-56 Roosevelt Ave., Flushing, N. Y. This counter unit is claimed to be applicable for counts



exceeding 10 cycles per second, a rate which is too fast for conventional counters, and is in installations where mechanical counters would wear out prematurely because of the high-speed continuous operation. Used alone as a two-decade instrument, the maximum count capacity of the electronic counter is 100. The instrument comprises an input section, suitable for any of the four enumerated types of input circuits: (a) contract closure, (b) pulse signals, (c) sine-waves signals, (d) square-wave signals, and two standard counter-decades, designated respectively as the units decade and the items decade, an output relay stage, and a power supply.

Pocket Size Standards

POCKET size sets of surface finish standards have been announced by *University Machine Co.*,

33 University Rd., Cambridge, Mass. These handy sets it is claimed, enable manufacturers to specify and check surface roughness without the use of delicate instruments. The human fingernail drawn across the surface of a machined part and then across the standard will detect differences of only a few millionths of an inch. These sets cover a wide range of min., and are available for both Ordnance and Aircraft standards. Each individual specimen is

actually machine cut from a stainless steel block. Pieces are mounted and identified in an attractive die-cast Dowmetal case which is small enough to slip into pocket or tool box.

Adjustable Spotfacers

TO save production time, save space, and cut tool inventory costs, *Robert H. Clark Co.*, Beverly Hills, Calif., has announced the production of a set of 4 adjustable Counterbore Spot Facers with exceptional cutting range. The set is identified by the number CS-1H. These adjustable spot facers are said to meet

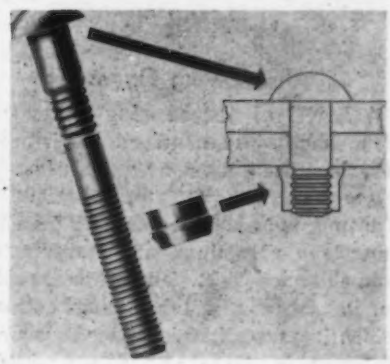
today's demand for greater surface speeds, chip clearance alloys faster feed and speeds. Holes may be counterbored to any depth, and cross-lip or shoulder prevents burrs from forming around the edge of the pilot hole and eliminates galling and binding. Pilots are hardened and ground. High-speed steel blades can be quickly and easily sharpened or replaced, and are always obtainable from mill supply distributors. Cast alloy blades are available for all counterbore sizes.

Grinding Wheel Dresser

AN improved type universal grinding wheel dresser that is designed for reproducing template forms as well as cutting angles and radii, has been announced by *Madco Products, Inc.*, 516 Fifth Ave., N. Y. 18. The dresser, designated as No. 41, is said to reproduce any number of times, template forms up to 1½ in. in length, cut angles at any degree and produce both convex and concave radii up to 1 in. Its design provides for setting with size blocks for radius dressing and with a sine bar for angle dressing when a higher degree of accuracy than can be obtained with the regular calibrated base dial is required. For radius cutting, diamond tool is first positioned with a gauge to bring the cutting point in correct relation with the axis of rotation of the dresser. Template or form dressing is accomplished by mounting the dresser head on a special base provided for this purpose.

Lockbolt Fastener

KNOWN as the Huck Lockbolt, an entirely different type of fastener is announced by *Huck Mfg. Co.*, 2480 Bellevue Ave., Detroit 7. The lockbolt first draws the work tightly together in the equivalent of a bolting-up operation, after which it is rigidly and permanently locked in place like a rivet. This new fastener consists of two precision parts, (1) a pin, which has a head of any desired type, locking grooves, a breakneck groove, and pull grooves which fit the jaws of the driving gun, and (2) a locking collar. After the pin is inserted in the work, the collar is slipped on and the gun applied. These lockbolts are claimed to be more quickly installed than bolts, and form a permanent fastening which cannot loosen under vibration or fatigue loading. No lock washers, cotter pins or special nuts are required. Hole-filling is provided where joints of maximum rigidity are



required, and uniform tightening is assured. The lockbolt can be installed by a single operator.

Slitting Saw

A COMMUTATOR slitting saw, designed to reduce tool breakage, has been announced by the *Gay-Lee Co.*, 117 Hazelhurst, Ferndale 20, Mich. It is made with a steel hub permanently bonded to a Carboloy cemented carbide blade, and is intended to eliminate fracturing due to the strain imposed by mounting screws or nuts. In addition to the longer life, teeth are generated to provide maximum strength, and cutters are slightly concave to insure proper clearance. These blades are said to perform undercutting and "U" slotting operations to exceptionally close tolerances. The hub is designed to support the cutting edge.

These saws are made in a wide variety of standard sizes, and in special sizes to customers' specifications.

Die Head

HARDENED and ground die head, called Landex, for use on automatic and semi-automatic screw machines, has been announced by *Landis Machine Co.*, Waynesboro, Pa. This new head has several features which assure more dependable service and greater thread accuracy. The major improvement of this Landex is the use of latch blocks which take the place of the locking ring. The latch block abutments are readily reground after they have become worn in service making a quick and economical means for repairing the die head. The latch blocks in this head are positioned in the adjusting ring. This is a decided advantage in that the abutments contact the back face of the closing ring in latching the head in the closed position. As the die head is adjusted for different diameters the latch blocks are continually using a different position on the abutting surface of the closing ring with the result that wear of any appreciable amount is extended over a considerable length of time.

Rotary File Kit

A METHOD of packaging rotary files and burs for the convenience and advantage of the user, has been announced by *Nicholson File Co.*, Providence. Built in the form of a miniature bench stand, thus enabling the mechanic to keep his files readily accessible when they are not in use, the Rotakit has a glass front for visibility and to protect the contents from dust. Three assortments are available: (1) Rotakit No. 20, containing ten ground burs, (2) No. 30 containing ten hand cut rotary files, (3) No. 40 containing five ground

burs and five hand cut rotary files. From this assortment, the mechanic can find a selection to meet his requirements in die sinking, pattern making, mold finishing, tool making and finishing small and intricate parts, and also for removing scale from small aluminum, brass and bronze castings.

Magnetic Chuck

A LAMINATED top plate of all steel construction has been announced by *Hanchett Mfg. Co.*, Big Rapids, Mich. By utilizing all steel top plate construction, the entire top plate can be hardened, this adding hundreds of production hr to the life

of the separate top plate. The same careful consideration for operating under every conceivable condition, wet or dry, means that the coils are carefully protected from moisture. In addition, the installation of these coils in the chuck is arranged so that the magnetic flux will be transverse to the length or opposing the action of the grinding wheel or cutting tool, thus reducing the possibility of work slippage. This chuck is available in five different sizes.

Gear Checker

GEAR checker, Model No. 1130, designed for the checking of tooth spacing on gears has been added to its line of Sine-Line checking equipment by *Michigan Tool Co.*, 7171 E. McNichols Rd., Detroit 12. The principle of operation of the machine

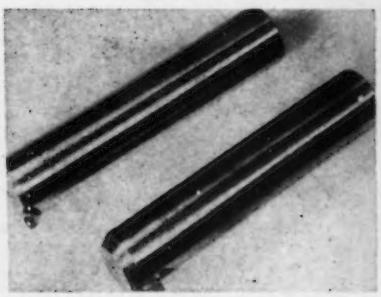
is based on the fact that the distance between the two corresponding sides of adjacent teeth along the line of action is equal to the distance between corresponding sides of adjacent teeth measured on the gear's base pitch circle. The No. 1130 measures along the line of action, indicating whether the spacing is correct both along the line of action and along the base pitch circle of the gear.

Thread Plug Gages

A LINE of thread plug gages of Tantung, a non-ferrous hard alloy, has been announced by *Master Gage Co.*, 2222 Fenkell, Detroit 21. Tantung is an alloy containing cobalt, tungsten, chromium and tantalum-columbium carbide. The latter is said to impart a self lubricating action which increases its resistance to wear. Tantung is dense and fine grained and takes a high finish. It is non-resisting, non-magnetic and is not corroded by moisture or any of the common acids or fumes.

Triangular Tool Bit

NOW being applied to boring bars, Tri-Bite, a triangular shaped tool bit, has been announced by *Weddell Tools, Inc.*, Rochester 9, N. Y. One or more Tri-Bits are fitted into triangular holes, tying the body together all around the blade. The triangular tool bit is locked securely home into a vee by a single lock screw. The blade is further backed up and minutely adjustable by a single adjusting screw in back of the blade. The Tri-Bits, of high speed steel, cast alloys or carbide tipped, may be reground in an individual grinding holder and reset to size.



Measuring Instrument

A HIGH amplification 5 tube Precisionaire has been developed by *Sheffield Corp.*, Dayton. Five tubes, each capable of providing an amplification of 18,000 to 20,000 to 1 are combined in one instrument to check ten points along the ½-in. diam of a critical part. The tolerance at each point is + or — 0.000005 in. Out-of roundness, taper and undersize or oversize conditions are disclosed. The part for which this application is designed mates with a part which is checked by a similar high amplification Precisionaire. Maximum and

minimum tolerance limits are indicated by lines on the transparent adjustable sight.

Oilgear Fluid Power extends range of amazing wire coating machines

The John Royle & Sons tubers are amazing machines that are coating millions of feet of wire with rubber or plastic insulation each week to meet the exacting requirements of the Signal Corps. Previously, not one of these tubers could produce its full capacity; the mechanical transmissions with which they were equipped originally just were not broad enough in their speed range to permit *one* standard tuber to coat *many* different sizes of wire uniformly with the required thickness of rubber or plastic.

But Oilgear Fluid Power could meet that need . . . and did. The Oilgear Transmission gives a broad range of controlled speeds to the capstan and rewind drive of this machine, enabling the latter to handle more sizes of wire and to do a much better job of coating the wire it handles. Similar benefits can be yours . . . if you will investigate the amazing possibilities of Oilgear Fluid Power for your straight line feeds or rotary drives. No matter what your power transmission problem is, you should know what Oilgear can do. THE OILGEAR COMPANY, 1303 W. Bruce St., Milwaukee 4, Wisconsin.

Oilgear Fluid Power enables this John Royle & Sons tubing machine to process many sizes of wire with required thicknesses of coating.

ARE YOU TRYING TO:

1. Apply large forces through long . . . or short . . . strokes at variable speeds?
2. Obtain automatic work cycles, variable speeds in either direction . . . with or without preset time dwell?
3. Apply large forces through continuous or intermittent reciprocating cycles at constant or variable velocities?
4. Obtain extremely accurate control of either position or speed of a reciprocating member?
5. Apply accurately variable pressure either static or in motion?
6. Closely synchronize various motions, operations or functions?
7. Apply light . . . or heavy . . . forces at extremely high velocities through either long or short distances of travel?
8. Obtain continuous automatic reversing drives at constant R.P.M. or over a wide range of speed variation?
9. Obtain accurate remote control of speed and direction of rotation, rates of acceleration and/or deceleration?
10. Obtain constant horsepower output through all or part of a speed range?
11. Obtain automatic torque control?
12. Obtain accurately matched speed of various rotating elements?
13. Obtain constant speed output from a variable speed input?
14. Obtain full preset automatic control, elimination of problems of shock, vibration, etc.?

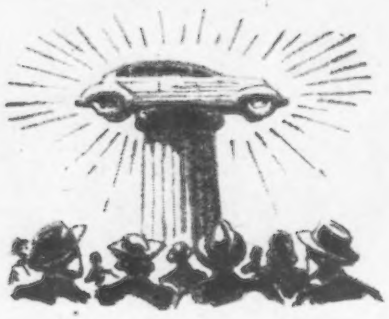
You Need Oilgear!

OILGEAR *Fluid Power*

Assembly Line . . . .

STANLEY H. BRAMS

• Output of 1946 model automobiles is moving very slowly . . . No more than 50,000 units or so will be built by the end of the year, against earlier expectations that a million would appear.



DETROIT—As the boys in the backroom have it, leave us put aside the highly significant, but dully repetitious, picture of the labor problem in the automobile industry and turn instead to the production situation prevailing at the moment and for the immediate future.

Last summer this column anticipated that somewhere around a million passenger cars and trucks could be built during the balance of this year. However, this represented the ideal rather than the concrete; labor problems have thrown that prophesy awry, as has been said so many times since. The million is boiling down to somewhere around 50,000 passenger cars for the entire year, plus something like 60,000 trucks per month which have been steadily obtained during the past two quarters. This despite the fact that industry now stands completely reconverted for at least fairly substantial production, if not the mass volume which was scheduled to begin by next spring in most companies.

General Motors is on strike and shut down. The others are not on strike, but they are limping very badly as a result of labor troubles in supplier plants and occasional shortages caused by inability of the supplier plants to obtain sufficient complements of labor.

Ford has now turned out less than 25,000 passenger cars, far below its projection of 80,000 units for this year. The problems at the Rouge are manifold—one day glass is the barrier, the next day seat cushions, the day after that gears for transmissions. Production is now approximating 1000 units a day, counting Mercury and Lincoln assemblies as well as Fords. Employment at the Rouge, it should be noted, now stands at 71,040 men and women, as compared with a wartime peak of 100,-172. At present hiring is continuing at a rate of about 300 per day.

Chrysler Corp. is turning out to limp worse than any other automobile company in the reconversion parade. As yet it has not shipped any cars to dealers, although it has built at least several hundred in show models and other special jobs which apparently are being warehoused. One reason for this situation appears to be glass; reports are that Briggs is unable to procure window glass or windshields for Chrysler bodies.

Studebaker is building a few cars now and then, according to reports from South Bend, but its operations have been on a very limited basis due to the Warner Gear Co. strike at Muncie, Ind., which has tied up all transmissions for that producer. The same strike has halted output on Willys jeeps for the past nine weeks, and in consequence the year's projection of 8000 assemblies has been fulfilled only to the extent of about 2000. With orders on hand for 30,000 jobs, employment would be up somewhere around 4000 persons instead of 1500 if sufficient banks of transmissions and other parts could be obtained.

Packard is running on a hit and miss basis, with daily output varying all the way from 25 to 100 units. Employment is close to 10,000, but sustained operations are impossible in the face of intermittent and sporadic shortages of die cast parts, upholstery requirements, garnish molding, and other needs.

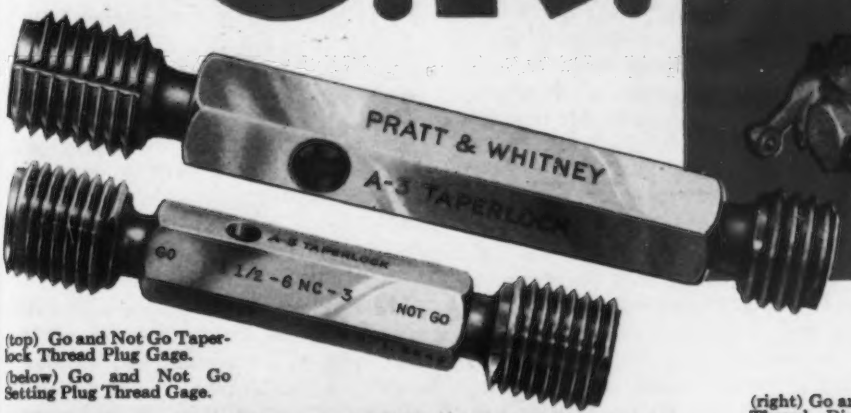
Nash has just gotten going, but its production is on a hand-to-mouth basis and at the present time window hardware ordinarily obtained from General Motors is looming up as an obstacle of real difficulty. Early plans have been to build 26,000 units during the final quarter of this year, but no more than 9000 will have been completed by New Year, and at that point bearing, connecting rods, crankshafts and other parts will be equally as tight as the window hardware.

Hudson has been producing on an in-and-out basis for the past fortnight. Shortages of castings and of frames have impaired the outlook for this producer, which had expected to build upwards of 120 units a day before now.

In the light of this production gloom, optimism over the future is a pleasant contrast. This week's specific optimism comes from Ypsilanti, Mich., where engineer Preston Tucker revealed plans for what must take

NEW TRUCK: *A new type truck, known as the Eisenhauer Twin Engine truck, especially designed for fast, long distance hauling, has been developed by the truck division of The Eisenhauer Mfg. Co. of Van Wert, Ohio. Use of four front wheels in tandem relation makes possible greater load capacity through better distribution, and accomplishes easier steering. Powered by two 93-hp motors —which can be used together or independently—the payload capacity is about 20 tons.*

THREADS FIT *when a P&W Gage* Says O.K.



(top) Go and Not Go Taper-lock Thread Plug Gage.
(below) Go and Not Go Setting Plug Thread Gage.

(right) Go and Not Go Thread Ring Gages.

Interchangeability, dependability, and, above all, the *exact fit* to ever narrowing tolerances — these are the prime requisites for screw threads in today's production. This puts the burden squarely on the shoulders of the Thread Gage, a gage that is used in every shop, large and small.

Top source for the all-important Thread Gage is Pratt & Whitney . . . and it is a wise decision to insist on P&W if you want to be sure of avoiding excessively high production costs or assembly failures. Years and years of experience and skill have taught P&W the precise material, the precise heat treatment, the precise design and production method to turn out a particular gage *exactly*, according to size, type, and application.

The name PRATT & WHITNEY on any thread gage is your assurance of accuracy, quality and dependability second to none. While we have all standard types and sizes in stock, we are ready at any time to design and produce for you special thread gages for special applications. Full information on P&W Thread Gages will be sent promptly upon request. Carbide Thread Plug Gages quoted on application.

PRATT & WHITNEY

Division Niles-Bement-Pond Company

WEST HARTFORD 1, CONNECTICUT

place as one of the most radical of the crop of designs and brain children served up on the postwar automobile menu. The Tucker Torpedo, it is understood, is the subject of discussion between its developer and at least one of the aircraft companies, but as yet nothing has come of it.

The super-streamline job is powered by an engine mounted between the rear wheels whose output is directly transmitted through a turret converter. Chassis would be of welded steel tubing, fabricated like a plane fuselage. Over this would be built a plastic or aluminum body, built on inexpensive kirksite dies or possibly single dies with rubber blankets to make the mate.

The engine itself, quite mysterious as yet, would be a 2-cylinder unit producing upwards of 100 hp, thereby putting it into the aircraft powerplant category. The engine would weigh 250 lb. Fuel injection would be used instead of a carburetor. The engine would be so designed and so installed that it could be disconnected very simply by removing four bolts and unsnapping an aircraft type connector which hooks in oil, electric and gasoline lines.

Kaiser-Frazer Plans Production of Own Automobile Bodies

Willow Run, Mich.

• • • Joseph W. Frazer, president of Kaiser-Frazer Corp., today announced that his company will manufacture its own bodies for the new Kaiser and Frazer automobiles.

This step has been taken, Frazer said, in order to insure the highest quality and increased economies in the production of the two cars. Many auto manufacturers receive either the complete bodies or the majority of the body assemblies from outside vendors.

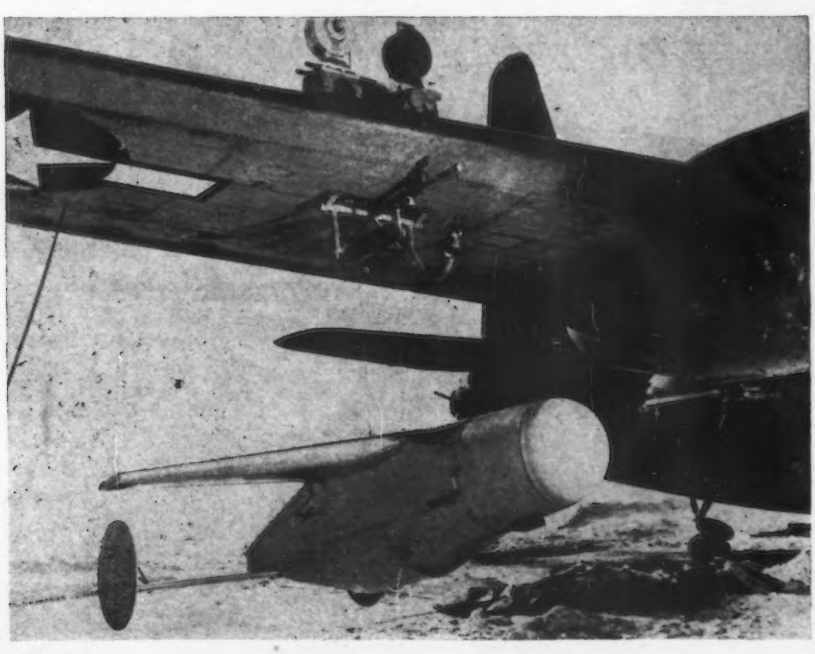
"Both Mr. Kaiser and I have made this important manufacturing decision in order to be able to pass on to the consumer the highest quality materials in these automobiles at the lowest price," Frazer declared.

Frazer, who is president and chairman of Graham-Paige Motors which is also operating at Willow Run, said the first of a series of huge 900-ton presses are now being made for the Kaiser-Frazer Corp. for installation within the next 60 days.

He said that to insure most efficient production the company has made "broad experience" the essential requirement of all those employed in the body manufacturing division. Norman C. Schassberger, who has 15 yr of body engineering experience, recently was appointed chief body engineer of Kaiser-Frazer, and Fred R. Watson, formerly with Chrysler and Fisher Body, is manager of the body division.

Volume production of the Fraser is expected to begin about March with the Kaiser following approximately six weeks later.

BAT BOMB: *Launched by British Navy patrol bombers outside the range of enemy antiaircraft fire and guided to distant targets by radar, the "Bat" bombs destroyed many tons of Jap shipping during the last year of the war. Photo shows pulley device lifting the robot "Bat" to its launching position under the wing.*



Releases New Electric Arc-Welding Standards

New York

• • • A complete set of new standards for electric arc-welding machines and electrodes, publication No. 45-105 September 1945, has been released by the National Electrical Manufacturers Assn.

This latest revision of the standards developed by the electric welding section through consultation among manufacturers, users, power companies, and national engineering societies incorporates the desirable changes resulting from wartime experience, and covers a most important postwar requirement—ac welders for the farm and small community repair shops.

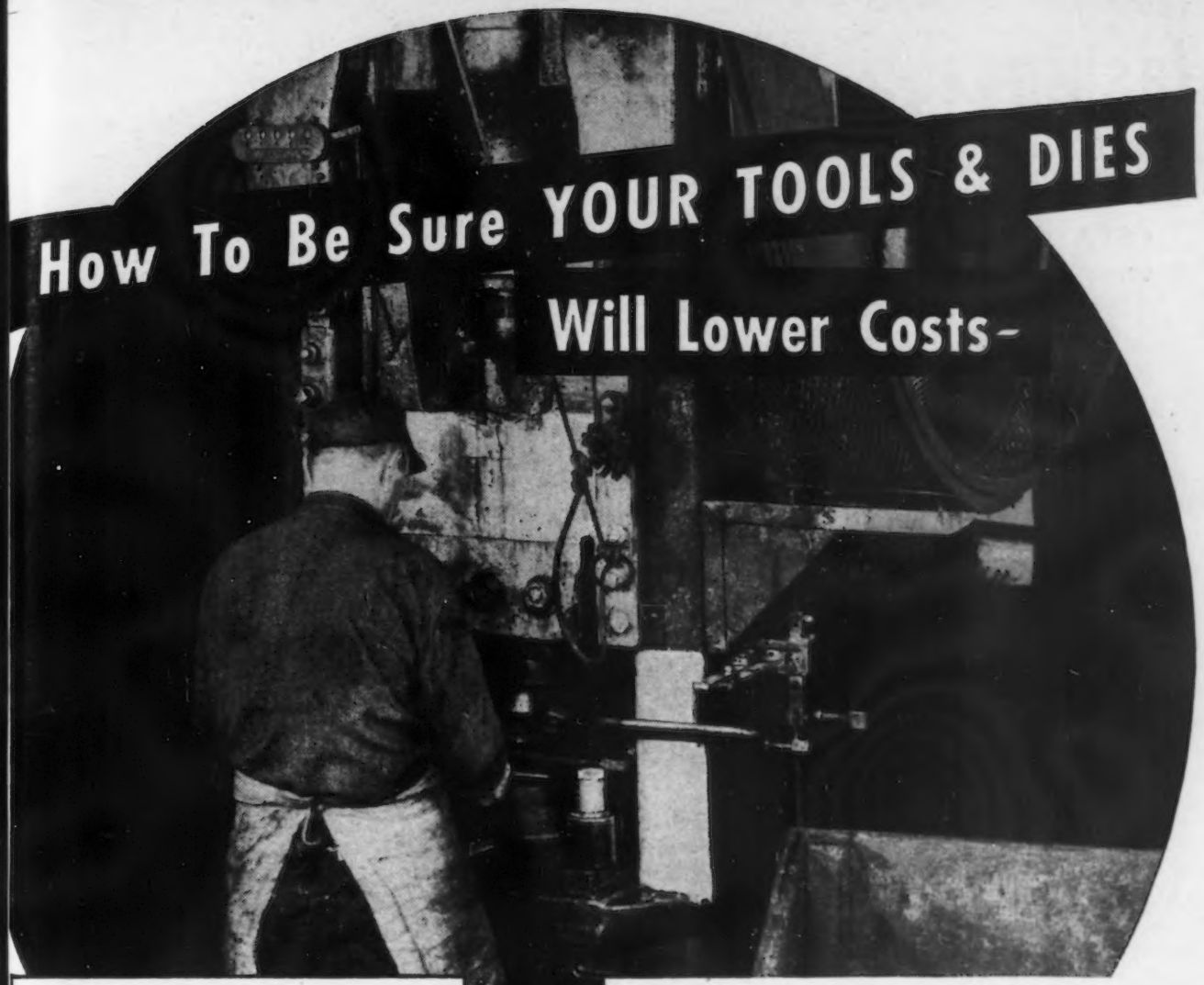
The welding standards completely cover dc welders of both variable-voltage and constant-potential types, including circuit control equipment for the latter. Also included are two types of alternating-current, transformer-type arc welders, designated as the industrial type, single-operator and the limited-input type. The new standards coordinate and simplify the method of rating welders without basically changing the size of the welder.

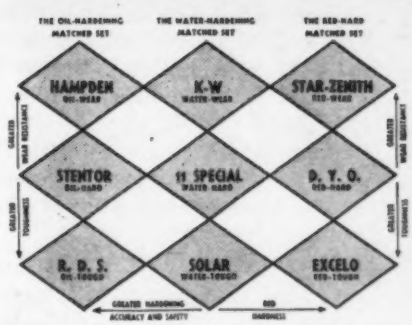
A new standard for transformer arc welders below 200 amps is introduced for the first time. These welders are designated as limited-input type, transformer arc welders. This new standard is developed to apply to welders served by single-phase power lines of limited capacity supplying farm or small communities.

The electrode standards have been revised and published in two parts. The part covering classifications, standard diameters and package weights is included in the present publication. The new standard for color markings for electrode identification is published as a separate standard, publication No. 45-108.

The new standard may be obtained from the National Electrical Manufacturers Assn., 155 E. 44th St., New York 17, New York.

How To Be Sure YOUR TOOLS & DIES Will Lower Costs-





The Matched Set Diagram Really Works

The key steel is the one in the center, *No. 11 Special,* a straight carbon, tough timbre water-hardening tool steel. When you have a tool to make, you first find out if it should be made from *No. 11 Special.* If the answer is "Yes" you go no further. But when the answer is "No", you use the diagram to point the way to the proper tool steel for the job. For greater wear resistance you go north, etc. Just follow the diagram.

Suppose you really want to cut tooling and production costs. You can't guess when you want longer runs and less machine down time.

You want to know *before* a tool is made just what it will do on the job.

And there *is* a way to plan tool performance *before* tools are made. Hundreds of Tool Engineers are using it. And they're getting the results they want with the Carpenter Matched Set Method.

Put this Method of selecting tool steel to work in your tool room. With it you can quickly and accurately get the wear resistance, hardening accuracy or toughness you want in a tool.

Start making the Matched Set Method work for you now. Ask your nearby Carpenter representative for a copy of the "Matched Tool Steel Manual." It is the starting place for tools that stay on the job longer and reduce production costs.

Carpenter MATCHED TOOL STEELS

The Carpenter Steel Co., 121 W Bern St., Reading, Pa.

Washington . . . L. W. MOFFETT

• SPA recommends some magnesium producers be kept in partial use . . . None to be standby . . . Sees no postwar export market.

WASHINGTON — Faced with peculiar problems relating to future markets, possible monopoly and unascertained military demands, the Surplus Property Administration in its recent report to Congress on disposal of magnesium plants and facilities recommended that no plants be kept in unused stand-by condition but that some be kept in partial use for production of magnesium or other materials involving maintenance of facilities which could be rapidly converted to magnesium production.

With annual postwar civilian demand estimated at 30,000 tons or less and the only prewar producer having 18,000 tons of the lowest-cost private capacity together with the right of first refusal on some 45,000 tons of the most efficient government-owned capacity, there is considerable hesitancy on the part of other companies to engage in postwar competition.

The Dow Chemical Co. was the sole producer of magnesium from 1927 until 1941 at which time Permanente Metals backed by the Kaiser interests entered the field. During the war nine other companies began production of magnesium as operators of government plants but with the closing of these plants there are again but two producers. Toward the end of the war there were nine companies, including Dow, engaged in recovery of secondary magnesium from scrap.

Prior to the war, there were about 25 fabricators of magnesium. During hostilities, over 90 companies engaged in fabrication. Dow was the only metal producer who also operated fabricating facilities on an integrated scale comparable to operations of Alcoa and Reynolds Metals Co. in the aluminum field.

However, Dow does not have the same dominance in the fabricating field as in ingot production. Dow-owned capacity, the report states, is: sand castings, 8 pct; permanent mold castings, 12 pct; die castings, 6 pct; sheet, 18 pct; extrusions, 30 pct; forgings, 64 pct. The contribution of the Dow Co. to the well being of the industry, the report declares, is unquestioned.

Expenditures by the government for magnesium producing facilities during the war totaled $370 million which is exclusive of a $28 million loan to finance the Kaiser-Permanente plant.

The result of this investment is the striking fact that the government owns 90 pct of the magnesium producing capacity as compared with 58 pct of the capacity to produce aluminum. Government-owned magnesium plants have a rated capacity of 263,000 tons annually, compared with a government-owned aluminum metal capacity of 680,000 tons.

THE total government investment in magnesium fabricating plants is slightly over $31 million. This amount includes 11 government-owned plants and equipment located in 14 privately owned plants. As contrasted with aluminum which involved government financing of 54 pct of fabricating facilities, the investment in magnesium fabricating facilities was less than 8 pct of total expenditures for magnesium. Exclusive of scrambled facilities, the report estimates that the government owns the following proportions of fabricating capacity: sand castings, 37 pct; die castings, 20 pct; permanent mold castings, 1 pct; extrusions, 42 pct; forgings, 50 pct.

Dependent on aggressive research and market development, competent estimates of postwar consumption range between 28,000 tons and 31,500 tons compared with prewar consumption of around 2600 tons. A breakdown of these estimates is shown in table below.

Foreign demands cannot be relied upon to absorb any sizable portion of our domestic production. Even if German and Japanese capacity is removed, it is said, United States exports will be insignificant in view of the capacity abroad.

The report discusses the obstacles confronting the postwar magnesium industry together with a number of

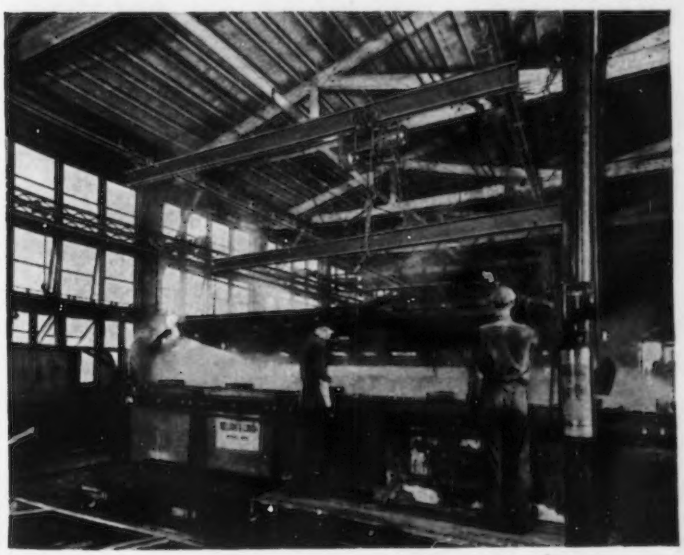
Estimates of Postwar Consumption of Magnesium
(In short tons)

	Dow	Tariff Commission	SPA
Total Consumption	31,500	32,250	28,100
Air Transportation—total	14,000	5,000	5,100
Military	.....	.....	4,500
Transport	.....	.....	300
Private Craft	.....	.....	300
Land Transportation—total	3,500	15,000	3,750
Passenger Autos	2,500	12,500	1,250
Busses and Trucks	1,000		2,250
Railroads	.....	2,500	250
Water Transportation	.....	250	500
Portable Tools and Manually Handled Equipment	2,500	5,000	3,500
Industrial Machinery	4,000		3,500
Furniture and Consumer's Goods	2,500	.....	2,500
Alloy Aluminum	1,500	5,000	4,500
Chemical Use and Cathodic Protection	3,500	1,000	4,500
Military Ground Matériel	.....	.....	250
Miscellaneous	.....	1,000	.....

American MonoRail Engineers, with their highly specialized experience, can relieve you of all details in cranes and overhead handling systems. They are constantly in touch with handling problems of every conceivable kind. At the beginning of the project their assistance in preparing an accurate and efficient layout will insure successful operation of the system.

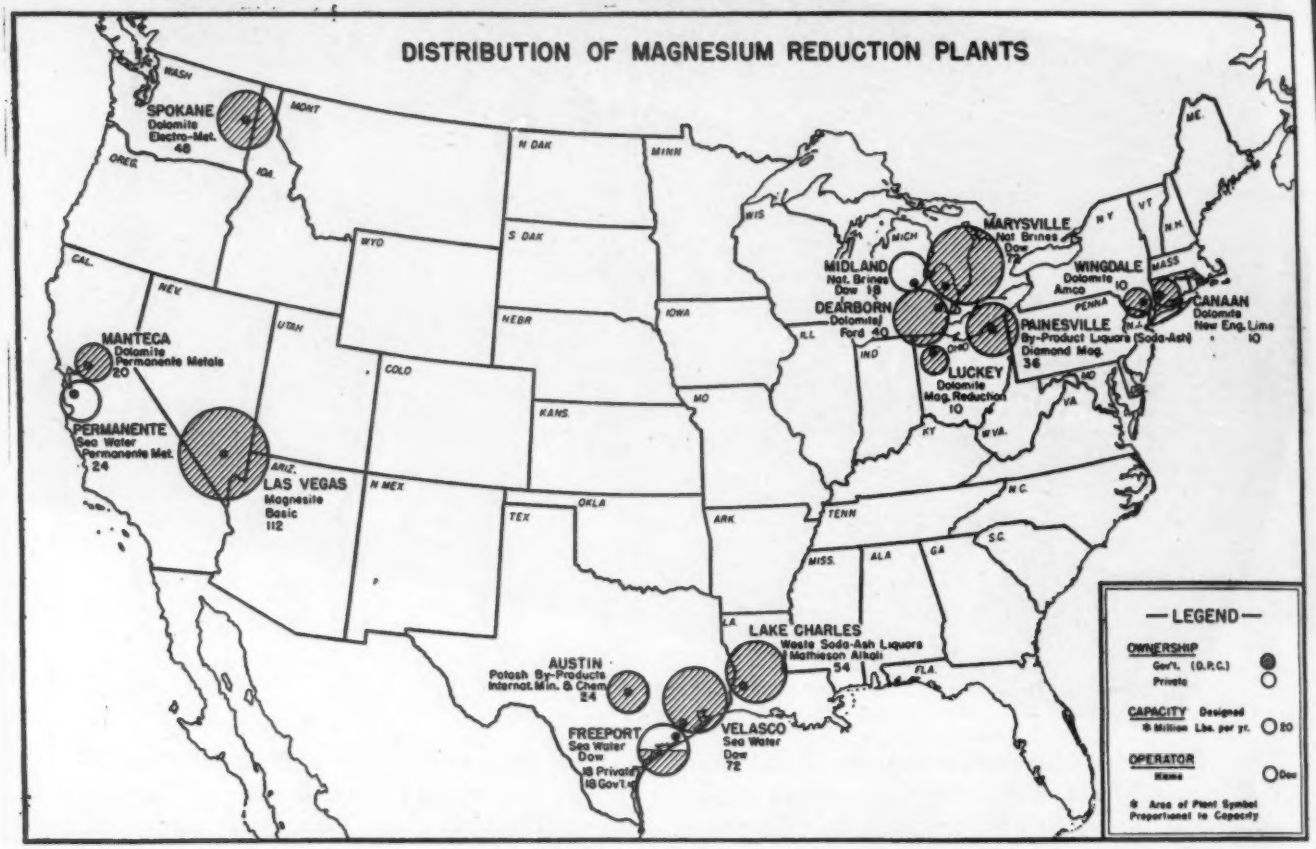
Let us send you a copy of our 264-page engineering manual covering Mono-Rail Carriers and Cranes.

These engineers are conveniently located in nearly every industrial center for immediate consultation. This service is gladly offered without obligation.



THE AMERICAN **MONORAIL** COMPANY

13103 ATHENS AVENUE CLEVELAND 7, OHIO



factors favorable to increased civilian consumption of magnesium.

The outstanding deterrent to increased use, the report points out, is the relatively higher price spread between ingot metal and fabricated forms which is greater than for any other metal. Furthermore, prospective users are hesitant because of lack of performance data and knowledge on design and use. There is also a fear of fire hazards. Manufacturers are also reluctant to adopt new machinery required for an entirely different metal.

A government aluminum program resulting in much lower price levels for that metal, the report declares, could have serious impact on the magnesium market. Thus, secondary aluminum might be available at 40 pct of the magnesium metal price instead of 70 pct as at present.

The factors which are favorable to increased consumption, according to the report, are (1) aggressive sales promotion and educational efforts now being made by the fabricating concerns, (2) the practical working experience in magnesium which metalworking concerns have gained during the war, (3) magnesium users may avail themselves of foundries established during the war, (4) there is a much larger and more flexible rolling and extruding capacity, (5) increased sales should result in lower prices for semifabricated forms and shapes, and (6) greater output can be secured in machining of magnesium than any other metal.

However, the extent to which magnesium will be used in the future, the report states, depends heavily in most cases on reducing fabrication costs.

(CONTINUED ON PAGE 112)

THE BULL OF THE WOODS — BY J. R. WILLIAMS

HERE, TRY THIS SQUIRT GUN ON HIM! BOY, WILL THIS ROUT HIM OUT--IT'S LOADED!
DID YOU MAKE THAT? HUMMP-- ON COMPANY TIME AND MATERIAL! WE MUST LOOK INTO THIS!
THEY'RE TRYIN' TO WAKE UP TH' CRANE MAN, BUT THAT DOPE HAS WOKE TH' BULL OF TH' WOODS UP!
TIME WAS WHEN YOU COULD MAKE A LOCOMOTIVE ON TH' SLY HERE--ONE GUY DID, BUT TH' FOOL BLEW TH' WHISTLE AT TH' GATE!
12-21
J.R.WILLIAMS
THE UNDERGROUND
COPR. 1945 BY NEA SERVICE, INC. T. M. REG. U. S. PAT. OFF.

CRUSHER ROLLS FOR ALL STANDARD THREADS 8 TO 32 PITCH, [illegible] IN STOCK FOR IMMEDIATE DELIVERY.

CRUSHER ROLLS FOR SPECIAL THREADS AND ANY TYPE OF PRECISION FORM CAN BE MADE TO YOUR SPECIFICATIONS.

POWER CRUSHING DEVICE FOR USE ON A SURFACE GRINDER.

Headquarters

FOR CRUSH DRESSING EQUIPMENT FOR THREADS and FORMS

Grinding with crush dressed wheels has so many advantages from the standpoints of accuracy, speed, and economy that it took little time for it to become firmly established in the metal working industry. Sheffield, the American pioneer of this practice on a commercial basis, can furnish you with the equipment you need to put it into operation in your own plant.

SHEFFIELD PRECISION THREAD AND FORM GRINDER FOR DUPLICATING CRUSHER ROLLS AND THE MASS PRODUCTION OF WORK PARTS THREADED OR FORMED.

POWER CRUSHING DEVICE FOR USE ON THE SHEFFIELD THREAD AND FORM GRINDER FOR THE ACCURATE CRUSHING OF WHEELS.

SHEFFIELD MICRO-FORM GRINDER FOR PRODUCING THE ORIGINAL CRUSHER ROLL, FLAT OR CIRCULAR FORM TOOLS AND PROFILES OF ALL KINDS.

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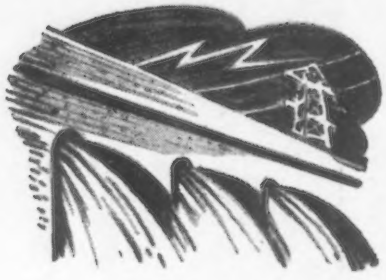
MACHINE TOOLS • GAGES • MEASURING INSTRUMENTS • CONTRACT SERVICES

SHEFFIELD MASTER CRAFTSMEN

West Coast . . .

OSGOOD MURDOCK

• Norris Stamping prepares to enter equipment field with national distribution . . . Kaiser protests sale of pig iron from government-owned Geneva . . . Bechtels to launch home construction project.



LOS ANGELES—Some time after World War I Charley Chaplin starred in a picture called Shoulder Arms in one episode of which he emulated and parodied the feat of Sergeant York. Single-handed he brought in a sizable batch of prisoners and when asked how he managed to do it, repiled simply, "I surrounded them." In somewhat the same fashion Kenneth T. Norris, president of the Norris Stamping & Mfg. Co., approaches the problem of capturing a modest portion of the national household utensil and electrical equipment market.

It is no secret that several far western manufacturing concerns so heavily engaged in war production until recently have detailed studies of manufacturing and engineering plans for every conceivable type of product ready and waiting to be put into operation as soon as the labor and materials markets clarify themselves. Many and many of these plans have been permanently shelved because of insurmountable obstacles in distribution. Engineering and manufacturing are the simplest part of the projects; the hitch lies in the incontrovertible lack of economic feasibility of selling the products from the West Coast in competition with eastern manufactured goods. Norris now makes a frontal attack on the problem in a contract with Sears Roebuck to produce a long line of appliances and products, thereby slashing in one fell swoop the basic deterrent—sales costs.

There is no trick to manufacturing electric refrigerators, washing machines, plumbing fixtures or bathtubs if the manufacturing concern is already equipped with necessary facilities and manpower. What to do with them after they are produced is the question. Company after company, from Boeing in the Pacific Northwest to Lockheed in the South are known to have similar plans for every conceivable type of product ranging from automobiles, trucks and buses down to hairpins and thumbtacks, but practically all of them are being abandoned or shelved for a variety of reasons. Disclosure of Mr. Norris' plans serve as a stimulus to the entire front of the vaunted western "postwar plans."

The company also intends to manufacture stainless steel barrels, automobile wheels, hub caps and gas tanks for the western automobile assembly industry. Other products include license plates, spherical butane containers, metal stepladders, soap and towel dispensers and other items too numerous to list. A new plant at El Monte, Calif., will turn out the motor frames and cases for Thor washing machines.

Anticipated volume of sales is as difficult to predict as the volume of rain that will fall next year, but company officials talk in terms of "10 or 12 times prewar sales." And western businessmen are inclined to accept the estimates at face value.

Principal obstacle in the path of the company's manufacturing plans is the continued shortage of sheet steel on the Pacific Coast. Mr. Norris pulls no punches on the subject and maintains that his production schedules alone could consume all the sheet which is being allocated by eastern mills to the entire West Coast. With sheet being sold on a basis of prewar consumption under producers' allotments stricter than anything ever devised by the WPB, Mr. Norris puts his finger on the chief hurdle in the path of western industrial expansion at the present time.

Mr. Norris is chairman of the steel committee of the Western States Council, the organization which is leading the western effort to reduce Pacific Coast base price differentials on raw steel products.

Best index as to the probable outcome of southern California's Norris Stamping & Mfg. Co. in its contemplated invasion of national markets is the fact that San Francisco manufacturers are occasionally heard to declare that "what the northern California steel business needs is Kenneth Norris."

One of the interesting aspects of Norris' operation is the company's profit-sharing system. Every worker gets a 5¢ per hr wage raise after 60 days, 120 days and one year's employ-

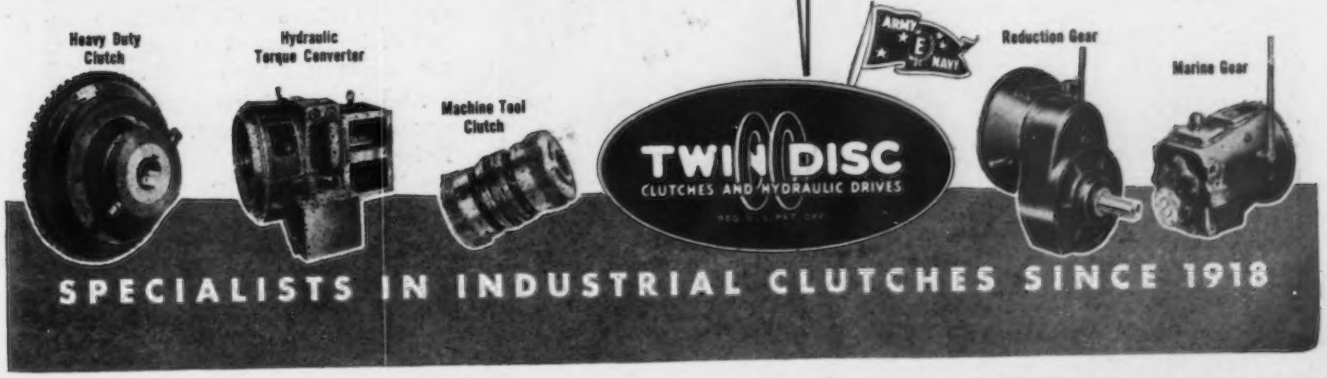
MISSION COMPLETED: *The Douglas XB-42, an experimental bomber, arrives at Bolling Field, Washington, D. C., after a record-breaking flight of 5 hr, 17 min, and 34 sec from Long Beach, Calif. The ship subsequently crashed near Anacostia, D. C. and was completely wrecked.*

Hangman's Helper...

The faded whorl of a fingerprint... the telltale texture of a wisp of hair... patiently probing the smallest detail until a noose of evidence tightens around the killer. That's the hangman's helper, the crime technician.

Industry, too, must have its patient probers. Twin Disc, for example, has for 27 years specialized in studying every detail of the transmission and control of power. This care to the smallest detail in the development, manufacture and application of Twin Disc Clutches and Hydraulic Drives is the reason why Twin Disc offers *proved power links* for almost every industrial application ... is why, today, so many leading equipment builders rely on Twin Disc to provide the most efficient connecting link between driving and driven unit.

If the equipment you build poses a problem in power transmission or control, why not draw on the wide experience of Twin Disc engineers? Their recommendations as to "friction or hydraulic" will be impartial and unbiased... gladly given without obligation. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).



SPECIALISTS IN INDUSTRIAL CLUTCHES SINCE 1918

ment. In addition 20 pct of the company's net profit goes into a fund which is paid to employees at the year end. Each worker gets his proportionate share of the company's profit up to one-fifth of his annual earnings. Mr. Norris says that it doesn't cost the company anything because of the increased efficiency of the participating workers. Wages paid are as high as or higher than those paid any place in the country. On two different occasions employees have voted against unionization and collective bargaining and at present the plant is operating on an open shop basis.

* * *

LOCAL businessmen are laying foundations for the establishment of a textile industry which will ultimately represent a $250 million investment with plans well into the blueprinting and initial investment stage.

Cross hauling of fabrics used in the western clothing industry has cost California an estimated $18 million a year. Following recent engineering and marketing studies from western cotton on through to the finished product, a group of industrials centering around Los Angeles Chamber of Commerce members have just about completed detailed plans for the establishment of the first western textile factory. This is slated to be the first of what may develop into another major southern California industry.

* * *

Bechtel-operated Calship, among the largest war shipyards in the country, is reported to be negotiating with the Maritime Commission for the property and facilities which they now occupy.

Authoritative sources indicate that the $40 million yard and a great deal of available material and supplies will be adapted to the residential construction business. Among materials held by the yard are large quantities of lumber, pipe, plumbing, steel, sewer pipe and other commodities suitable to the construction field.

* * *

SAN FRANCISCO—Sale of pig iron by Geneva Steel Co., to Bethlehem Pacific Coast Corp., is due to end this month.

Kaiser Co., Inc., at Fontana, Calif., filed a protest with the RFC against the government-owned plant competing with private industry, and Dr. Walther Mathesius has ordered discontinuance of shipments to Bethlehem "unless it can be shown that Bethlehem is unable to fill its requirements from privately operated plants." As little doubt exists about Fontana's ability to furnish pig in considerable quantity at the present time, the result of the appeal is regarded as a foregone conclusion.

Just as one swallow doesn't make a spring, one blast furnace on the West Coast may not finally solve the supply problems of the Coast steel industry, but the protest serves to emphasize what western businessmen continue to regard as the absolute necessity for decision on the subject of Geneva.

The plant has been operating one blast furnace under the terms of the present 8-month contract and selling whatever part of the daily 500-ton output anyone cared to buy. Discontinuance of the sale of Bethlehem will mean that Geneva will stack and store its pig instead of selling it.

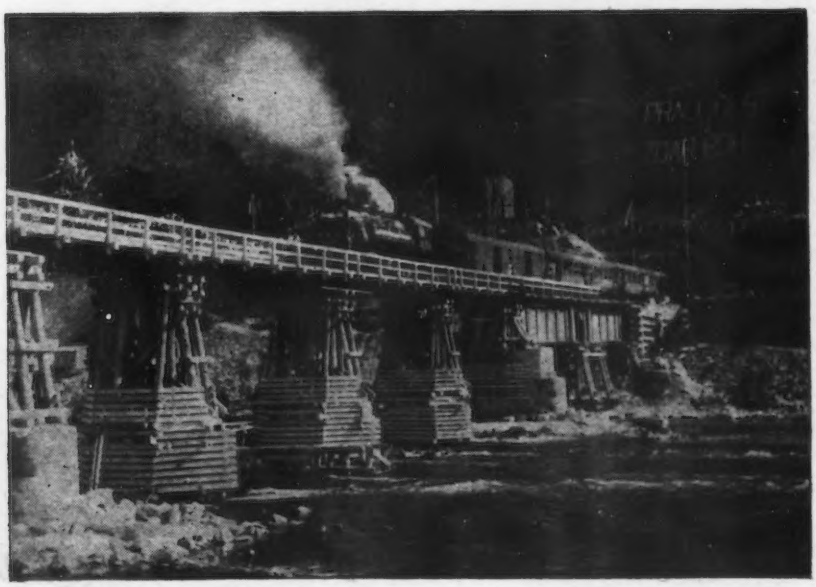
Bethlehem Pacific Coast's pig requirements are estimated at around 3500 to 4000 tons a month at present. Columbia is not in a position to supply from Provo the needs of an outsider, so it seems obvious that Bethlehem will have to return to the status of a Kaiser customer or resume shipments from Sparrows Point —which latter is not regarded as an immediate likelihood.

In the long run Fontana's operation depends on the costs of available pig iron and scrap on the Pacific Coast. To withdraw the output of one blast furnace from the market serves to limit the supply. The direct profit which the plant might derive from the sale of pig iron to Bethlehem is not enough to warrant any excitement in the office of the treasurer of the company, but it could well have a bearing on the allocation of overhead costs sufficiently important to have induced the recent move. Operating with a 35 pct hot metal charge there is a sufficient supply of basic metal for Fontana's operations, but at 65 pct a pig scarcity would arise a series of interesting developments which would again make Geneva's contribution a welcome addition to the market.

As long as scrap can be obtained more cheaply than hot metal, Fontana's sale of pig iron to Bethlehem will stand the former company in good stead. But with an increased industrial activity on the Coast and consequent upping of production and attendant increased costs of scrap, the industry could conceivably lay out the welcome mat for pig iron from any source whatsover—whether government owned or not. That however is the long-run aspect of the situation. The immediate implications of the protest serve to reiterate the West's continued desire in regard to Geneva, that the government "fish or cut bait."

Also in the Kaiser domain, word comes from Portland, Ore., that Kaiser Co., Inc., is negotiating with the Maritime Commission for a lease on the Swan Island shipyard. The company proposes to pay a yearly rental of $12,000 for the property and equipment at the yard to continue ship repair work and industrial operations.

ROAD OPEN: *A rebuilt section of a railroad bridge between Zilina and Vuitkey, in Slovkia, is reopened to railroad traffic with a special celebration.*



THIS VERSATILITY

Also Has Many POSTWAR USES

The myriad requirements of war demonstrated the amazing versatility of Vickers Hydraulic Controls. There were so many kinds of jobs to do—jobs which had to be done better than ever before—jobs which had never previously been accomplished.

For example, in this illustration, the plane has Vickers Hydraulic Control for brakes, automatic pilot and cargo door operation. The lift trucks have Vickers Hydraulic Control which lifts and positions the load accurately at the finger-touch of the operator. The graders building air fields use Vickers Hydraulic Power for steering front and rear wheels, raising, lowering or side shifting the blade, and operating the attachments.

These are just a few of the war jobs Vickers Hydraulics have done. Others include the precision movement of heavy battleship turrets—the automatic aiming of anti-aircraft guns—the fast precision positioning of ammunition hoists—the control of bomber gun turrets—and others which, cannot yet be described.

VICKERS HYDROMOTIVE EQUIPMENT

Many of the intricate machine tools that produced the machines that won the war depended for their accuracy, production speed, and ease of operation upon Vickers Hydraulic Controls.

This demonstration of the remarkable versatility of Vickers Hydraulic Controls suggests many new applications to a wide variety of postwar equipment.

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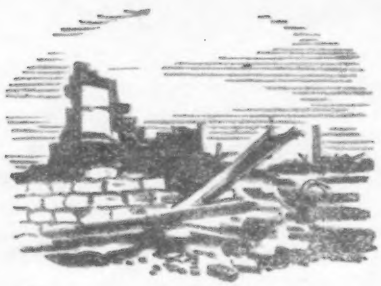
ANY FEED RATE · ANY TRAVERSE RATE · ANY R P M

ANY SEQUENCE OF MOTIONS · ANY ACCELERATION OR DECELERATION · ANY THRUST . . . . . .

European Letter . . . JACK R. HIGHT

• Details of British Five Year Plan for steel being disclosed... Continuous strip and universal beam mills included in construction program.



LONDON—Based primarily on the social and economic requirements of the various production centers of the British Isles, detailed plans for the modernization of the British iron and steel industry are gradually being unfolded by various firms.

Extensive plans already announced call for a new hot strip mill at Port Talbot, in South Wales, and for two new cold reduction units, to be located in the Llanelly and the Swansea areas, and for a universal beam mill to be located on the River Tees.

Guidance of the Labor government is being felt in the rationalization of the iron and steel industry, as well as all others. Thus, no decisions are considered final on the location of any new facility until all the factors important to the nationwide interest have been duly considered. Thus, although the announcements of the various new developments are coming from individual firms, it is certain that they have been approved in advance by the Steel Control before they are publicly announced.

The new hot strip mill for South Wales has been mentioned frequently in the press here, and it is likely that the final order contracts were signed within the past two weeks for the mill. It is to be built for Guest Keen Baldwins Iron and Steel Co., Ltd., which is 40 pct owned by Richard Thomas & Baldwins. The new mill is to be capable of producing 18,000 tons of hot strip and other products per week, most of which is to be destined for the tinplate industry. The project is to be complete with coke ovens, blast furnaces, and open hearths.

The parent firm, Thomas & Baldwins, is also drawing up plans for the formation of two new firms for the operation of the cold reduction mills at Swansea and Llanelly. It is explained that as a part of the "district" development program, the social implications of putting most of the old pack mills out of operation prevented the location of the cold reducing mills at Port Talbot. Briton Ferry Steel Co., Ltd., and Llanelly Associated Tinplate Companies, Ltd., will also be associated in the construction and operation of the two cold reducing mills, although control will be in the hands of Thomas & Baldwins.

The formation of such a group, with smaller tinplate firms associated in the enterprise roughly in proportion to their interest in the older type of mills shows the further effects of a "planned" steel industry which is being arranged as a part of Britain's controlled economy.

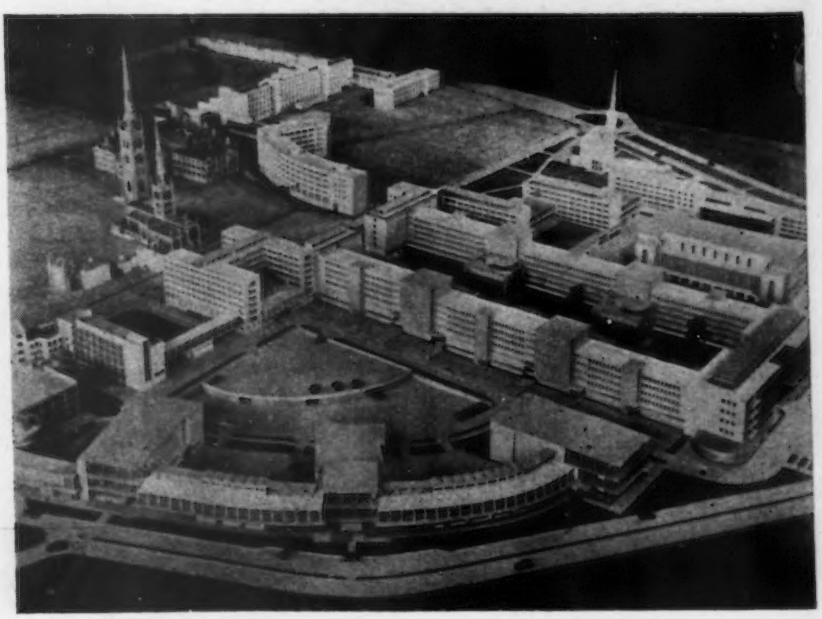
IT is possible that in addition to the above mentioned construction a smaller cold reduction plant will be built in the Monmouthshire area, but the firm involved has made no official announcement as yet. This mill will be divorced from the Thomas & Baldwin organization entirely. When these plants are in operation it will become necessary to close down Britain's old type pack rolling mills, and either sell them for scrap or convert them to any practicable use.

The mills described above will complement the Ebbw Vale mill built in the immediate prewar years by Richard Thomas & Co. Tinplate production in this mill has already totalled over 5 million boxes per year. It was the first continuous strip mill to be built in Great Britain, and has only one other competitor today.

Another segment of the modernization plan which has already been officially confirmed is the universal beam mill to be built for Dorman Long & Co., Ltd., at a cost of about $32,000,000. The plant is to be located between the firm's existing Cleveland and Redcar works at the mouth of the River Tees. Although the beam mill is the central feature of the project, other work will be undertaken at the same time.

The beam mill is designed to produce a broad flange section not hitherto rolled in Great Britain, and the firm estimates that it will when com-

NEW COVENTRY: *Nazi bomb damage to the city of Coventry on Nov. 15, 1940 was so complete that the words "coventryize" and "coventrated" have been coined to describe complete destruction. This model has been made of the Coventry of the future—cathedral is at left.*



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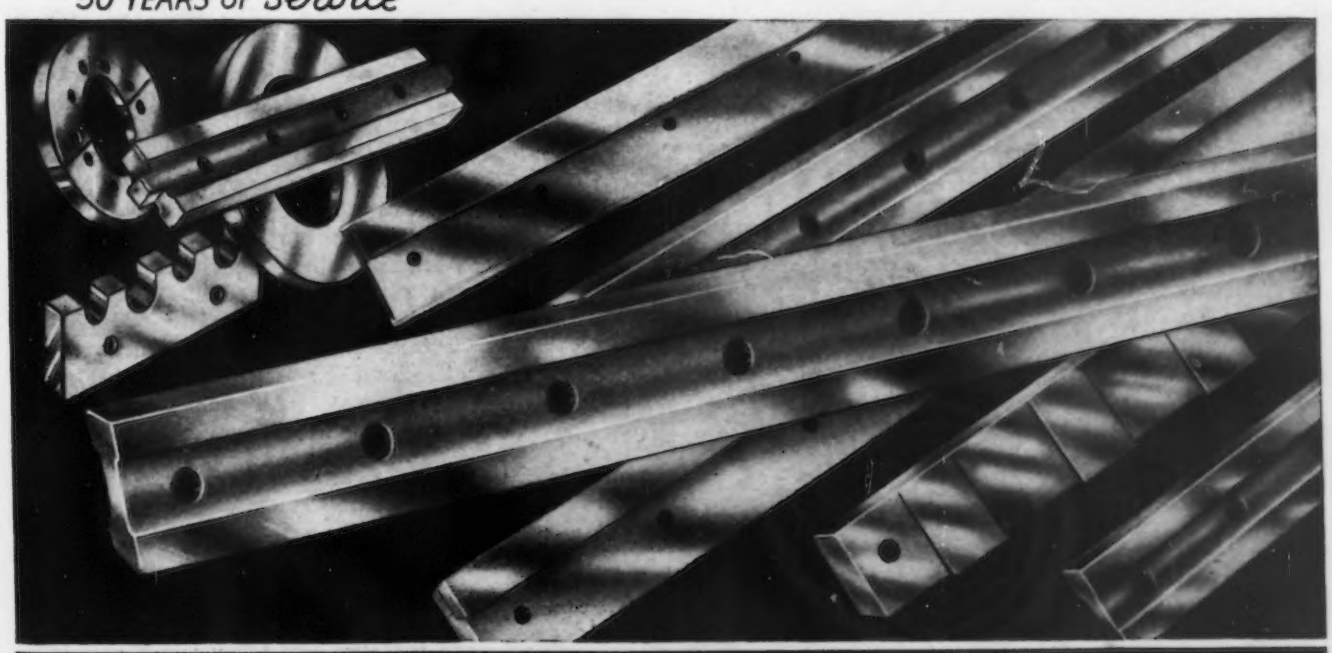
Wapakoneta Shear Blades are made and heat treated, ***not*** to meet some universal standard of our own, but to best fill each customer's requirements... That is why Wapakoneta Shear Blades stand up longer on the job and cut more tonnage.



The Wapakoneta Machine Company

INCORPORATED 1891 — Wapakoneta, Ohio U.S.A.

Steel Exporting

London

• • • Sir Walter Benton Jones, chairman and managing director, United Steel Companies, Ltd., on the occasion of the annual general meeting of the companies:

"The value of iron and steel exported (from Britain) as such in 1938 represented 8 pct of this country's exports. But indirectly iron and steel forms an important part of the much larger contribution to export trade, viz., 19 pct made by other sections of industry in the form of hardware, machinery, and vehicles of all kinds. .It contributes still more to the construction of ships. . . .

"We have been told repeatedly in recent months by those in high authority that to regain our prewar standard of living we must increase exports by multiples varying from 50 pct to three times. . . .

"In the years before the war rising imports were reducing the British balance of trade, and in 1937 there was an adverse balance of more than fifty million pounds ($200,000,000). We have therefore to reverse this trend as well as to make up losses inflicted upon us by the war, in both cases by increasing exports.

". . . A number of things which we exported before the war we shall now export in less quantities—for example coal—and some not at all. The loss we shall have to make up with increases of 75 to 100 pct of other things or with other things which we have not exported before."

pleted "revolutionize" some 75 pct of this country's steel joist production. Here again, the plan is to specialize the whole nation's need for a single product in as few plants as possible (in this case a single plant) to afford as economical production as possible.

Designed for an annual capacity of 350,000 tons of beams, the mill is to be built along most modern American lines, although it is stated that some modifications will be made to suit certain British requirements. A large new open hearth steel plant will be constructed on the site, to furnish ingot at lowest possible cost.

Approximately 23,000 tons of machinery and 14,500 tons of steel work will be used in the construction of the blooming mill and the finishing mill, and an additional 17,500 tons of steel will be required for the openhearth shop. The construction time is estimated at "not less than 2 yr under ideal circumstances."

It is reported here that the firm has a "rational" outlook on the future of the rest of the industry producing such beams, and is willing to "enter into certain arrangements." It would appear that this means that the general plan is for the British Steel Control to guide the establishment of a policy which will protect the interests of the owners of older mills. If such an arrangement follows the pattern set up in the industry when the Ebbw Vale mill was built, submarginal producers will draw certain funds from a common pool, irrespective of whether they are in operation or not.

THE same firm has also announced plans for the modernization of its Cleveland works, at a cost of over $4,000,000. Plans include the construction of a central ore unloading, ore preparation, and sintering plant. (Reports are rife in Britain of the arrival of a "secret" cargo of equipment from the Hermann Goering Steel Works in Germany. Steel producers here are known to greatly admire the sintering equipment from that plant.) The installation at Cleveland will permit the largest ships in the ore trade to be rapidly handled, and plans call for halving the time of unloading. The plant will be equipped to handle over 2,000,000 tons of imported and domestic ores annually, and will supply the blast furnaces of the existing works, as well as those of the new mill.

Location of the plant on the Tees is also designed to facilitate the shipment of the finished steel into the export market, where it is thought much of the demand will be found.

One concept of the modernization program which is being disclosed here might be that it is a race to prevent nationalization. The iron and steel industry was given a mandate by the Coalition government to draw up a report on its plans for rationalization and modernization.

It was stated at that time that no decision on further control of the industry would be attempted until that report was in. The new government is withholding judgment until the report is received, and it is stated to be nearly ready. It would seem evident that if the industry draws up its own plans for the future, and the government is unable to improve upon them, that there will be little incentive to actually taking over the mills. This is especially true in consideration of the tight rein which the government can hold whenever it wishes through the medium of the British Iron and Steel Federation. In fact there is a segment of opinion in industry here today which asserts that all that would be necessary for the government to achieve a practical nationalization would be to appoint a new head to the Federation.

SAMPLE TYPES: *A prefabricated "village" in the Great Hall at Alexandra Palace, North London, displays full-sized models (plywood and canvas) of the three types of permanent prefabricated houses offered by Mr. Bevan, Minister of Health. The three types are pressed steel, steel-framed and concrete.*

"You save the cost of the hole..."

This hydraulic cylinder *could* be hogged out of bar stock, but tubing does the job with less waste, at less cost—because the "hole" is there to start with. This basic advantage of steel tubing is obvious enough to be often overlooked.

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Frasse has long specialized in the distribution and development of steel tubing. Backed by over 45 years experience in tubing and its uses, Frasse counsel is freely available on your production or procurement problems. Call us.

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PERSONALS

HERBERT F. BYRNE, director of production planning, U. S. Steel Corp. of Delaware.

• **Herbert F. Byrne** has been appointed director of production planning of the U. S. Steel Corp. of Delaware, Pittsburgh. Mr. Byrne joined U. S. Steel 3 yr ago after a long career in the automotive industry. He was with the Hudson Motor Car Co. in Detroit for 17 yr and was president of an automobile distribution organization in Philadelphia before the war. Since 1943, he has been an executive in the Production Planning Div. of Carnegie-Illinois Steel Corp.

• **Paul W. Eberhardt** has been elected to the office of a vice-president of Walter Kidde & Co., Inc., New York. His principal duties will include management of domestic sales of the company's fire-fighting equipment in aviation and general industry, together with general supervision of field selling activities. Mr. Eberhardt joined the company in 1926.

• **Bingham H. Van Dyke** has been appointed manager of the new products dept. of the Elliott Co., Jeannette, Pa. He was previously assistant to the director of research and development and came to Elliott Co. from the WPB where he was deputy chief of the heat exchanger and pressure vessel branch.

• **John B. Freese** has been made director of purchases of the Ashton Valve Co., Cambridge, Mass.

• **J. O. Speed**, past chairman of the Alabama Chapter, American Society of Safety Engineers, has been appointed safety counselor of Birmingham Electric Co., Birmingham.

• **Frank E. Wartgow**, formerly connected with Hasbrouck Haynes Engineers, and American Steel Foundries, and **Herbert F. Scobie**, former instructor at the University of Minnesota, have joined the headquarters staff of American Foundrymen's Assn., Chicago. Mr. Wartgow has had 13 yr experience in the industrial engineering and foundry field, and is vice-president of the Chicago chapter of the association.

• **John G. Barta** has been appointed manager of the Allis-Chalmers Mfg. Co., Duluth, Minn., branch sales office succeeding **William H. Knight**, resigned. Mr. Barta is now with the Milwaukee district office.

• **Frederick B. Langreck** has been transferred to Monsanto Chemical Co.'s general development dept., where he will specialize in projects for olefine manufacture and utilization. **Edwin J. Putzell, Jr.**, until recently assistant to Maj. Gen. William J. Donovan, director of the Office of Strategic Services, has joined Monsanto as assistant to F. A. Ulmer, treasurer.

• **W. A. Umlauf** has been named sales manager of the Holland-Rieger Div. at Sandusky, Ohio, of Apex Electrical Mfg. Co., Cleveland. Before joining the Apex organization in 1943, Mr. Umlauf spent 6 yr in charge of Ohio sales for Wallace and Tierman, Bellville, N. Y. **C. D. Thomas** has joined the organization to assume responsibilities in matters of sales promotion and sales training under the direction of Frank S. Ryan, Apex advertising and sales promotion manager.

• **Nicholas Fenger**, formerly of the Babcock & Wilcox Tube Co., Welded Tube Div., has been appointed chief engineer of the General Tube Co., Newark, N. J.

• **Lewis R. Sanderson**, formerly general manager of the government-owned Blue Bonnet, Tex., ordnance plant, has been appointed director of construction and reconversion by the National Gypsum Co., Inc. **E. Heath Van Duzee**, who has been management consultant of Barrington Associates, New York City, will plan and coordinate merchandising activities of the Gypsum concern. Both will make their headquarters in Buffalo.

• **Norman C. Macdonald** has been promoted to vice-president and general manager of the New York branch of the Crosley Distributing Corp. For the past 5 yr, Mr. Macdonald has been eastern regional sales manager for Crosley, and his successor in that position will be **Sherman A. Bishop.**

• **F. A. Wright** has been elected chairman of the industrial control section of the National Electrical Manufacturers Assn. Active in NEMA for a number of years, Mr. Wright served as vice-chairman of the industrial control section for a one-year term immediately preceding his new assignment. Mr. Wright is assistant general sales manager of Cutler-Hammer, Inc., Milwaukee.

• **W. F. Goetz** has been appointed manager of the Pittsburgh office and warehouse of A. Milne & Co., steel distributors, succeeding **H. L. Bodwell**, who is retiring from business. Mr. Goetz has been a member of the Milne Chicago office sales staff since 1935. **D. T. Haddock** has been appointed office manager in the Boston office and warehouse. F. G. Grant remains as branch manager in general charge of eastern New England sales. Mr. Haddock was transferred from the Milne Washington office, where he has been manager since 1941.

• **Lt. Col. A. E. R. Peterka** has resigned from the Reconstruction Finance Corp. to return to the Lamson & Sessions Co. of Cleveland. He was relieved from active duty last March to set up an organization for the disposal of surplus aircraft parts and components in Washington, D. C.

A. E. R. PETERKA, returned to Lamson & Sessions Co.

• **T. E. Dela Court,** identified for many years with the manufacture and merchandising of household furnishings, has been made the new president of Tracy Mfg. Co., Pittsburgh.

• **Charles W. E. Clarke** has been elected vice-president and consulting engineer of United Engineers & Constructors, Inc., of Philadelphia. Mr. Clarke has specialized in the field of steam engineering practice for the past 35 yr and has served as consulting engineer with United Engineers & Constructors, Inc. since its organization in 1928. **Stanley C. Cook** has been elected vice-president and construction manager. He has been prominent in the construction industry for the past 30 yr having had charge of the construction of many large industrial and institutional developments with particular emphasis in the Philadelphia district. **Benjamin S. Thayer** has also been elected vice-president and construction manager of United Engineers & Constructors, Inc., having served with this organization since 1928.

• **Wilson H. Moriarty** has been elected vice-president in charge of sales, National Malleable & Steel Castings Co., Cleveland. Mr. Moriarty has been assistant to the president. **James A. Slater,** whose career with National Malleable has covered 48 yr, has retired as vice-president in charge of railway sales. He will continue as a director and as assistant to president and will act as consultant in railway matters.

WILSON H. MORIARTY, vice-president in charge of sales, National Malleable & Steel Castings Co.

• **Robert C. Schenck** has been elected executive vice-president of the Duriron Co., Inc., Dayton. He has been with the company for 19 yr. **Delbert E. Jack** has been elected vice-president in charge of engineering and sales, and will make his headquarters at the New York office.

• **George W. Lonergan,** president of the H. V. Walker Co., Elizabeth, N. J., has been elected treasurer of the National Magnesium Corp. of Maryland. **John J. Conroy, III,** has been elected president and **Milton Lennard,** vice-president. General offices of the corporation are in New York City.

• **Richard W. Girvin,** for over 8 yr vice-president in charge of sales with the Willmark Research Corp. of New York City and most recently with the Englander Co., Inc., has been appointed retail sales manager, cellulosic dept. of the International Plastic Corp., Morristown, N. J.

• **Lester Beltz,** former chief of electrical engineering at Packard, has joined the engineering dept. of Ford Motor Co., Dearborn, Mich. **John C. Widman,** body designer for Murray Corp. and **Howard G. Reed,** assistant administrative engineer at the Packard-Toledo plant during the war, have also joined the company.

• **Charles E. Kline** has been elected vice-president in charge of sales of the United Tube Corp. of Ohio. Mr. Kline's experience has included association with several major steel plants —the Brainard Steel Corp. of Warren, Ohio, the Steel & Tube Div. of Republic Steel Corp. in the company's New York and Cleveland branches, and the Strip Div. of Republic Steel.

• **Howard Rushton** has been appointed general manager of the Freight Car Div., Mt. Vernon Car Mfg. Co. Mr. Rushton will make his headquarters at the plant at Mt. Vernon, Ill. For the past 9 yr he was works manager of the Pressed Steel Car Co., Pittsburgh.

• **Raymond T. O'Keefe, Jr.,** has been elected vice-president of the Kropp Forge Co., Chicago. Mr. O'Keefe has been associated with the company since early in 1942 when he was appointed personnel manager. Effective immediately, he will be special assistant to Roy A. Kropp, president, in matters pertaining to the general operation of the business and his sales representative in the Chicago area.

B. DELACOUR BEAMISH, president, director and member of executive committee, National Can Corp.

• **B. Delacour Beamish,** formerly administrative vice-president, has been elected president, director and member of the executive committee of National Can Corp., New York. **Arthur G. Hopkins,** vice-president, has been appointed to the board of directors.

• **John M. Newman** has been recently appointed general engineering supervisor over Steel Mill, Machine Tool, Brakes & Drum Controller Divs. of Cutler-Hammer, Inc., Milwaukee.

• **Walter T. Baker, Jr.** has been appointed eastern sales promotion manager of the Electric Appliance Div. of Westinghouse Electric Corp., Pittsburgh. Mr. Baker, formerly supervisor of district range and water heater sales in New York, returns to Westinghouse after 4 yr of service with naval patrol squadrons.

• **Frank J. Feely,** manager of Western Electric Co.'s specialty products shops in New Jersey, has been appointed manager of the company's electronic components manufacture. These manufacturing operations will be moved into a new plant to be constructed during the coming year at Allentown, Pa.

• **George L. Davis,** formerly general manager of sales for Carnegie-Illinois Steel Corp., has joined Continental Foundry & Machine Co., Pittsburgh, in a sales capacity, and **Edward Mitchell,** identified with the casting industry for the past 35 yr, has been appointed manager of alloy casting sales.

E. J. SANNE (left), manager of sales, Tin Plate & Export Div.; J. F. SMITH, JR. (middle), assistant manager, Sales, Sheet & Strip Div.; C. L. HOLMBERG (right), manager, Order Div., Inland Steel Co.

• **E. J. Sanne** has been appointed manager of sales, Tin Plate & Export Div., Inland Steel Co., Chicago, effective Jan. 2, 1946, assuming the responsibilities of **Frank R. Meyer, Jr.**, vice-president, who is retiring. Mr. Sanne was employed by Joseph T. Ryerson & Son, Inc., an Inland subsidiary, in 1917. He has served in the Ryerson Service and Sales Divs., as Inland's St. Paul district sales manager and as assistant manager of sales of the Sheet & Strip Div. Mr. Meyer came to Inland in 1911, from Standard Stamping Co. of St. Louis. He served in various capacities including district sales manager at St. Louis, assistant vice-president and vice-president in charge of sheet and tin plate sales. **J. F. Smith, Jr.**, manager of the Order Div., with 16 yr of experience with the company, succeeds Mr. Sanne as assistant manager of Sales, Sheet & Strip Div. **C. L. Holmberg**, assistant manager of the Order Div., will succeed Mr. Smith as manager of the Order Div. Mr. Holmberg has been with Inland 18 yr, serving in the Chicago district sales office, Pricing & Order Div.

• **Charles C. Martin** has been appointed a vice-president of Rheem Research Products, Inc., Baltimore. In his new position he will assume many of the duties and responsibilities previously held by the executive vice-president for the management and direction of the company. Mr. Martin has, since July 1944, been administrative manager and assistant director of the Rheem Mfg. Co.'s research laboratories at Pasadena, Calif.

• **Ross W. Swogger**, former export manager of the Oster Mfg. Co., Cleveland, will head his own export business, effective January 1946. His new business will specialize on various types of machinery and industrial products.

• **Col. Frank J. Atwood**, for the past 3½ yr chief of the Rochester ordnance district, Army Service Forces, has been named director of purchases for Remington Rand, Inc., Stamford, Conn., and its subsidiary companies. Col. Atwood's headquarters will be at the New York offices.

• **Shelton R. Houx** has been appointed assistant director of advertising of Nash Motors Div., Nash-Kelvinator Corp., Detroit.

• **C. B. Smythe** has been elected to the office of president of the Thew Shovel Co., Lorain, Ohio. Mr. Smythe will succeed his father, **F. A. Smythe**, who died on Nov. 8, after serving 46 yr as the first and only president of the company. Mr. C. B. Smythe joined the Thew Shovel Co. in 1910 and was elected vice-president of the company in 1920.

• **H. Norman Miller**, a member of the industrial sales staff of the Westinghouse Electric Corp. at Portland, Ore., for the past 19 yr, has been named manager for the company in the Portland area. Mr. Miller will succeed **L. G. Fear**, who will act as the company's special representative in both the Seattle and Portland areas to better coordinate the expanding scope of all Westinghouse activities throughout the entire Pacific Northwest and Alaska.

OBITUARY...

• **Leonard K. Payne**, treasurer of the Gary Steel Products Corp., Norfolk, Va., died Dec. 6.

• **William T. Dunn**, 74, retired New England representative of the H.B.A. Steel Co. of Sweden and general manager of the International High Speed Steel Co. of New York during World War I, died at Hyde Park, Boston, Dec. 1.

• **Jesse P. Bardwell**, 62, sales manager, Ward Steel Co., Boston, died Dec. 9. He was employed for 41 yr by their predecessor, Edgar T. Ward's Sons Co., holding various executive positions, being manager at Chicago and for the past 15 yr at Boston.

• **James Henderson**, 77, retired managing director of Appleby-Frodingham Steel Co., Ltd., and director of the United Steel Co.'s Ltd., both of England, died Nov. 20.

• **Carl G. Davis**, 61, treasurer of the American Saw & Mfg. Co., Springfield, Mass., and identified with other saw manufacturing concerns many years, died Dec. 5.

FAIRBANKS-MORSE DIESELS

Four-Time Winner

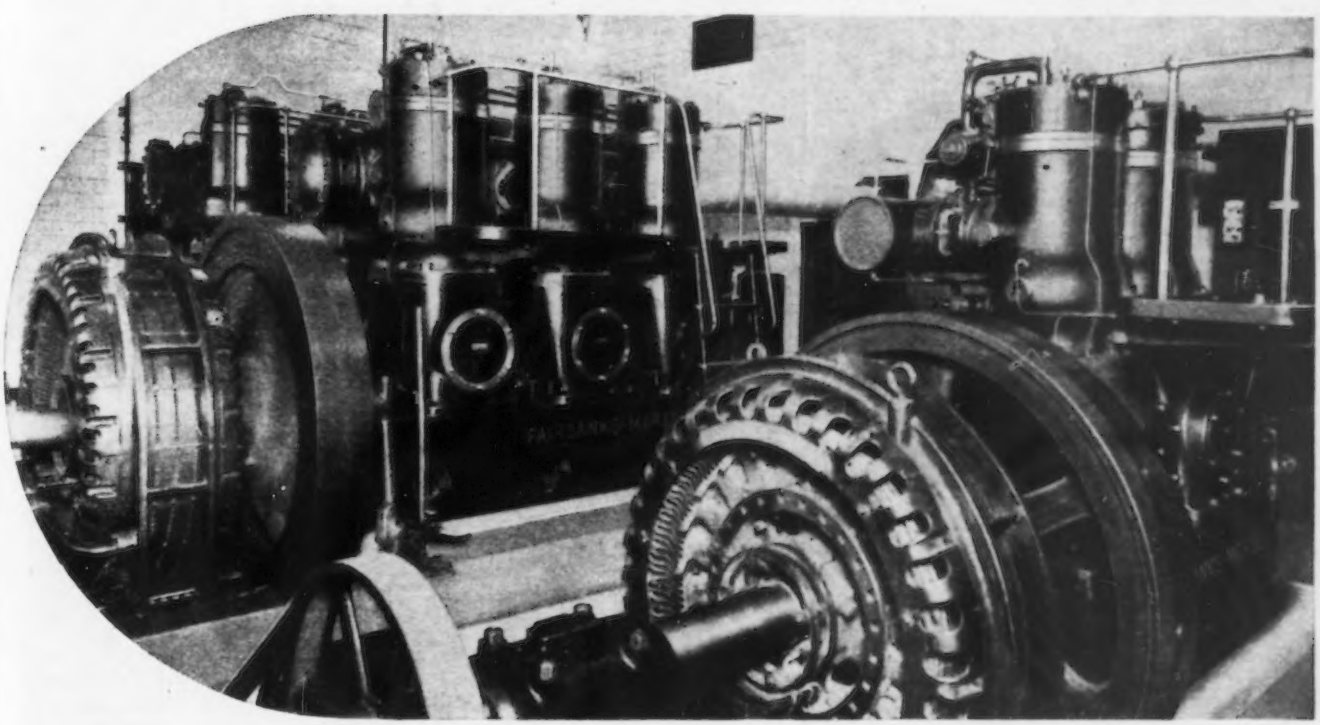
with Nylen Products

Because of the excellent performance and low operating and maintenance costs of their first Fairbanks-Morse Diesel, the Nylen Products Company, St. Joseph, Michigan, subsequently met increased power needs by installing three more engines of the same make.

Such repeat order records are anything but unusual at Fairbanks-Morse. During one typical prewar 16-month period, 80% (by horsepower) of all Fairbanks-Morse Diesels sold were repeat orders!

When you need more power, remember this—hundreds of users say *with repeat orders* that Fairbanks-Morse Diesels excel in dependability and economy.

Fairbanks, Morse & Co., Fairbanks-Morse Building, Chicago 5, Illinois.



Fairbanks-Morse

A name worth remembering

DIESEL LOCOMOTIVES • DIESEL ENGINES • GENERATORS • MOTORS • PUMPS • SCALES
MAGNETOS • STOKERS • RAILROAD MOTOR CARS AND STANDPIPES • FARM EQUIPMENT

Dear Editor:

TIME STUDY COMPUTATIONS

Sir:

Enclosed find our check for $2.10, for which please send us six copies of the reprint entitled "The Right and Wrong of Time Study Computations."

H. R. GOGAY
Douglas T. Sterling Co., Stamford, Conn.

● Reprints have been forwarded.—Ed.

HEAT TREATING EQUIPMENT

Sir:

We would appreciate receiving from you information relating to textbooks on heat treating equipment and processing.

C. O. RIGG, Office Manager
V & O Press Co., Inc., Hudson, N. Y.

● Would suggest "Steel Treating Practice" by Ralph H. Sherry (formerly metallurgical engineer with General Motors). It is published by McGraw Hill Book Co., 330 W. 42 St., New York.—Ed.

POWDER METALLURGY

Sir:

Please send me one copy of "Powder Metallurgy Precision Parts" by R. Hradecky and Richard P. Seelig, Sept. 27 issue.

G. STEVENSON, Chief Design Engineer
F. J. Stokes Machine Co., Philadelphia 20

● Tear sheets have been mailed.—Ed.

WESTERN STEEL DISPOSAL

Sir:

I enclose 10¢ mailing charge for a reprint of O'Mahoney's Disposal Report from the June 21 issue.

J. C. ROACH
B.H.P. Co., Ltd., Whyalla, South Australia

● Reprint has been sent.—Ed.

DIVERTING WATER ROUTE

Sir:

Can you refer me to the issue of your magazine which covered the subject of diverting the water of some lake or river in Canada from its normal direction of drainage to the Hudson Bay territory to a new direction of drainage to Lake Superior? The purpose of this drainage was to increase the water level in Lakes Superior, Michigan, and Erie to take care of increased tonnage in the shipment of ore on these lakes.

G. D. ROGERS
Symington-Gould Corp., Rochester 3

● We are sending you tear sheets of several articles on the Steep Rock project, which appeared in our July 8 and Sept. 2, 1943 issues, and Jan. 6, 1944 issue.—Ed.

FLUOROSCOPY OF METALS

Sir:

Will you please send us a copy of your article "Fluoroscopy of Light-Alloy Castings" by B. Cassen and D. S. Clark, which appeared in the issue of Nov. 1.

CYRUS A. POOLE, Sales Manager
E. I. du Pont de Nemours & Co., Wilmington 98, Del.

● Tear sheets have been mailed.—Ed.

HEAT TREATMENT OF GEARS

Sir:

We request permission to reprint the article "Conveyorized Non-Decarburizing Heat Treatment of Gears" by W. J. Bornholdt and H. E. Scarbrough, which appeared in the Oct. 18 issue. The usual credit line will be extended.

C. B. COLLINGS, Production Section
General Electric Co., Schenectady 5

● Permission granted.—Ed.

METAL FINISHING

Sir:

Attached please find 50¢ in currency for the reprinted articles on "Metals, Finishes, and Finishing Processes."

C. STRECK, Plant Engineer
Hussmann-Ligonier Co., St. Louis 6

● Reprint has been mailed.—Ed.

REPRESENTATION IN INDIA

Sir:

We are desirous of importing all kinds of industrial plants and machinery, electrical equipments and engineering tools from your country. We will feel much obliged if you will kindly put us in touch with some manufacturers in the line desiring representation in India. Our bankers are the Netherlands Trading Society, (Dutch Bank), Bombay.

B. L. DAFTERY, Partner
Associated Machine & Tool Co., 130 Medows Street, Fort, Bombay

● Anyone interested?—Ed.

INFRA RED

Sir:

It has come to our attention that there is a new process for brightening the finish or polish of metal parts by the use of infrared. We have not been able to find anything in this regard in THE IRON AGE and are wondering if we have just overlooked it or if nothing has been printed as yet. We are particularly interested in any methods of bright finishing stainless steel, gold, and silver. If you have any information on this subject or can tell us where to obtain such information, we will appreciate your assistance very much.

GORDON WITTERS, Purchasing Agent
Trail Metal Products Co., Inc., Miami 25, Fla.

● The only application of infra red we published are those relating to drying operations. We have not heard that infra red is used for imparting a polish to metals. We suggest that you drop a letter to Mr. Edward Engel, Consulting Engineer, Technical Process Div., Colonial Alloys Co., Philadelphia, as he is the author of the series of articles on the metal finishing process which THE IRON AGE recently published. —Ed.

WHOLESALE PIPE INQUIRY

Sir:

I am a recently discharged veteran and I am trying to start up in business again. I want to cut and thread pipe. Can you give me the names and addresses of places where I can purchase pipe wholesale?

STANLEY HASKEL
Carroll Products, Brooklyn 13

● A suggested list of companies has been forwarded.—Ed.

TURBOSUPERCHARGERS

Sir:

On pp. 88 to 93 of the Sept. 6 issue appeared an article by S. H. Brams entitled "Turbosupercharger Production Details." Would you kindly send us tear sheets of this.

E. W. WASIELEWSKI, Chief Engineer
Superchargers, Inc., Milwaukee 9

● We have sent tear sheets as requested. —Ed.

BASING POINT SYSTEM

Sir:

I would appreciate it if you would send a tear sheet of the article by Mr. Tom Campbell entitled the "ABC of the Basing Point System" published in the Oct. 4 issue of your publication.

CHARLES J. HENDRICKSON
Rustless Iron & Steel Corp., Baltimore 13, Md.

● Tear sheets have been forwarded.—Ed.

SCREW MACHINES

Sir:

We are very grateful to you if you can inform us the address of some manufacturer of small automatic screw machines.

RAFAEL A. GONZALEZ
Rafael A. Gonzalez Co., Sagua La Grande, Cuba

● We are forwarding a list of several manufacturers.—Ed.

T&W Stamping Answers

MORE than ever today, stampings are proving the ideal answer to manufacturers' parts and product needs. Transue design experience, craftsmanship and facilities for the production of deep drawn stampings are playing no small part in extending the scope of stamping answers. Whether your requirements call for a new or old application of stampings, you can depend on the reputation of T & W parts among a host of large users for highest quality and uniform physical properties.

Strength + Lightweight + Economy = Steel Stampings

DESIGNERS AND MAKERS OF DEEP DRAWN STAMPINGS

TRANSUE & WILLIAMS

ALLIANCE, OHIO

Sales Offices: New York, Philadelphia, Chicago, Detroit, Indianapolis, Cleveland

This Industrial Week . . .

- **OPA Seen on Spot in Wage Problem**
- **Profit Reports to Be Speeded Up**
- **Export Allocation 859,000 Tons**

IF some way out of the steel price impasse is not found before Jan. 14, the date set by the United Steel Workers Union for a strike, the steel labor situation will develop into a serious, bitter and lengthy controversy. The OPA is definitely on the spot because of its refusal to adjust steel prices this year.

Chester Bowles's refusal to increase steel prices generally until fourth quarter earnings are analyzed has caused extreme pressure to be brought to bear on him and his organization because final returns on steel company fourth quarter earnings would not ordinarily be completed until about Jan. 20, six days after the date set for the steel strike.

Because of this pressure some way is expected to be found to expedite completion of fourth quarter steel earnings reports even if some reliable estimates may have to be used for the final month of this year. Steel producers have absolutely refused to carry on negotiations with the union until prices are adjusted, which has thrown the ball to the OPA.

While some sources believe that with pressure on Mr. Murray to postpone his strike date until after OPA acts on steel prices and, with a chance that such action might even be taken before Jan. 14, there is no indication that the strike will not be called in any event. Mr. Murray has set the date for the purpose of forcing a wage adjustment equivalent to 30 pct or some other figure resulting from negotiations. Neither he nor his union have expressed any interest in the steel price situation.

If the OPA should in January grant price advances, such adjustments will be to cover accumulated material and labor costs and will not be related to any present wage demands. When and if the latter are eventually granted, the industry is expected to ask for a further price increase to compensate for any wage advances. It may be that the industry will attempt to obtain a guaranteed commitment from the OPA to the effect that wage increases will be followed by compensatory price adjustments.

REJECTION by nonintegrated steel producers of the OPA proposal that that sector of the industry be granted special price increases has produced virtual unanimity of agreement among all steelmakers that price adjustments must be made on an industrywide basis. Steel companies have been hard at work developing a basis for price adjustments which might be found acceptable to the agency.

The more optimistic steel officials believe that with a speeding up of steel price data, coupled with the spot in which the Administration finds itself over the entire labor situation, there may be better reason to look for a speedy settlement early next year on the steel price-labor argument. Others, however, point to the dilly-dallying of the OPA on price matters in the past and have their fingers crossed.

It is believed that the next price adjustment permitted by OPA will indicate more emphasis on the revision of steel price extras rather than base prices. Extras include charges made for specific physical or chemical characteristics. Some of them have grown like Topsy and it is said have been long overdue for a complete revision based upon new cost factors.

EXPORT demands which the industry feared would be allocated to the extent of 4,000,000 tons have been screened down to 850,000 tons over the next six months. This tonnage, it is understood, is over and above regular steel exports, and it is said to be slated to go to some countries which are not normally continuous buyers of American steel products.

An analysis of the initial plan indicates that the products to be allocated among the steel companies for export represent the same ones which are in such tight supply for American steel users. The tonnage tentatively includes 187,500 tons of steel bars, 224,500 tons of sheets, 133,500 tons of structural steel, 211,000 tons of tinplate and 87,500 tons of wire and wire products. Included among the countries to receive this material are: Continental France, China, Ukraine-U.S.S.R., Denmark, Italy and Australia.

Despite the screening down of the tonnage the 850,000 tons is considered to be a substantial amount to take away from domestic reconversion. Furthermore many steel officials are not entirely sure that the present allocation does not represent a "foot in the door." The Civilian Production Administration has told the steel industry that the latest figure is final, "at the moment."

The ability of the industry to carry a heavy overload of orders which in some cases are two to three times the production rate may be further decreased by unseasonable weather cutting down the flow of scrap. The industry is paying through the nose now for the coal strike this fall which prevented steel companies from building up a coal reserve against severe weather conditions. In order to conserve coke, heavy reliance has been placed on the use of scrap, the supply of which is now tighter than ever.

Steel ingot output this week is down two points to 81 pct of rated capacity, although initial schedules have indicated a rate unchanged from last week. The severe snowstorm in the Buffalo area almost entirely accounts for the two point drop, because of a shutdown early this week of many openhearth plants and blast furnaces in that district.

• **BRITISH FREIGHT CAR PRODUCTION**—Railroad freight car production is scheduled for five British ordnance factories which during the war were engaged in tank and gun manufacture. According to reports here the reconversion is only a partial one, with some ordnance production still scheduled. Ten thousand seam-welded, all steel, 15-ton cars are in the production program. Repair work on wooden and steel cars, and on a large number of British Army trucks is also scheduled. The trucks are to be sent from dumps in England to European countries needing transport, fit for another 10,000 miles of operation. Plants affected by the order are located at Nottingham, Manchester, Cardiff, Hayes and Woolwich.

• **RUSSIA'S COAL PRODUCTION PLANS**—Russian plans detailed recently include the expansion of the Donetz coal fields to exceed the prewar output of the Ruhr. Accomplishment of this goal is expected to require from 10 to 15 years' time. Production which today approaches half of the prewar figure is scheduled to equal the 1939 rate during 1947.

• **EUROPEAN LIGHT METAL OUTLOOK**—Dissolution of the Alliance Aluminum Co. of Basle, Switzerland is interpreted by some quarters as meaning that there will be no effort on the part of the world's producers of the light metal to re-establish the international cartel in this field. Alliance was the official media for operation of the cartel.

• **RFC WELDING EQUIPMENT SALE** — Welding equipment, inspection laboratory equipment and machine tool accessories located in Illinois, Indiana and Wisconsin are offered for sale by Reconstruction Finance Corp. under Chicago list No. B-64.

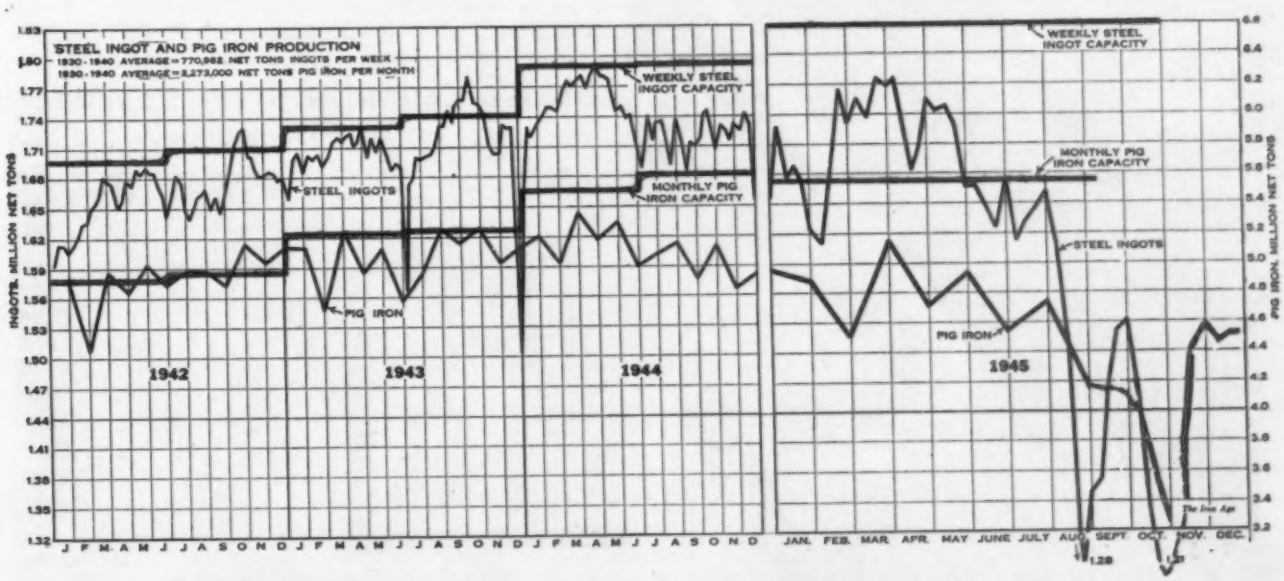
• **NEW DIRECTORY**—A new Iron and Seel Works Directory of the United States and Canada has just been published by the American Iron & Steel Institute. In a total of 566 pages, the directory presents descriptions of the productive equipment and capacities of United States and Canadian iron and steel plants. The data presented are as of Jan. 1, 1945. The many changes in the industry since 1938, when the preceding edition was issued, are reflected in the volume. At that time capacity for the production of steel ingots and steel castings was about 82 million net tons annually. Now it is around 95 million tons per year. The net edition is the twenty-fourth in a series which dates back to Nov. 1, 1873. Copies are available from the institute at a price of $10 each.

• **STEEL EMPLOYMENT GAINS** — Employment and wages in the steel industry were higher in October than in September, the American Iron & Steel Institute announced recently. The average hours per week worked by wage earners also made a slight gain. The industry's monthly payroll totaled $121,258,100, compared with $119,107,500 in September, and $141,656,700 in October 1944. The gain in October reversed a decline in total payrolls which started in June and took place month by month. The average number of employees in October was 521,700, compared with 521,200 in September and 564,300 in October 1944. Here again the latest report marked the end of a decline which started in April.

• **EXCESS STEEL CABLE**—The War Dept. has released as surplus 3,714,050 ft. of steel cable and 1,455,077 ft. of steel wire to RFC for disposal.

• **ORE DEPOSITS**—Five iron ore deposits near Scappoose, Ore., explored by the Bureau of Mines in cooperation with the geological survey, Dept. of Interior, have been estimated to contain nearly 4,750,000 short tons of ore, Director W. E. Wrather of the geological survey reported on Dec. 17. The ore ranges between 40 pct and 59 pct iron content with rather high phosphorus and some manganese, it was announced.

• **SMALL STEEL PRICE ISSUE**—Small steel companies would be seriously harmed by the OPA's recent offer of higher prices, Lauson Stone, president, Follansbee Steel Corp., Pittsburgh, said in radio interview sponsored by the American Iron & Steel Institute. The OPA offer would be the "kiss of death" for the small companies, Mr. Stone said, because they could not then compete with their big competitors on an equal footing. Thirty-nine out of a total of 80 small steel companies, will lose money in the last three months of 1945. Mr. Stone estimated OPA's proposal of a two-price system for steel instead of helping the small companies would threaten their very existence and the jobs of the hundred thousand people they employ. OPA should allow any steel company to sell its steel at a fair profit, according to Mr. Stone.


STEEL INGOT AND PIG IRON PRODUCTION
1930-1940 AVERAGE = 770,982 NET TONS INGOTS PER WEEK
1930-1940 AVERAGE = 2,273,000 NET TONS PIG IRON PER MONTH
WEEKLY STEEL INGOT CAPACITY
STEEL INGOTS
MONTHLY PIG IRON CAPACITY
PIG IRON
INGOTS, MILLION NET TONS
PIG IRON, MILLION NET TONS
1942
1943
1944
1945
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
The Iron Age

Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
December 11...	78.0	90.0	80.0	81.5	85.0	102.0	80.0	95.0	101.0	50.0	78.0	70.0	89.5	83.0
December 18...	78.0	90.5	75.0	81.5	86.0	63.0	81.0	95.0	101.0	50.0	81.0	70.0	101.0	81.0

OTISCOLOY PLATES

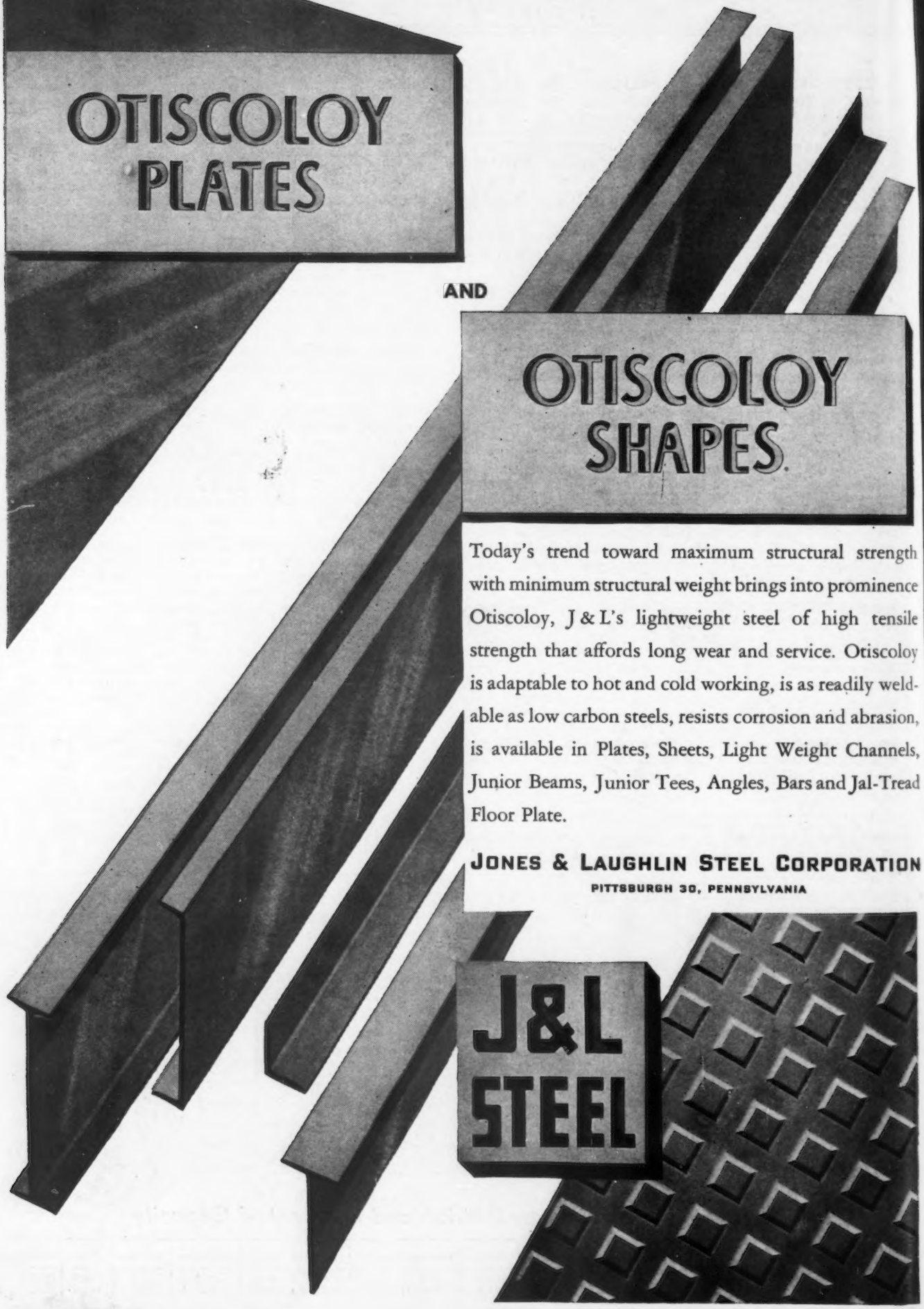
AND

OTISCOLOY SHAPES

Today's trend toward maximum structural strength with minimum structural weight brings into prominence Otiscoloy, J & L's lightweight steel of high tensile strength that affords long wear and service. Otiscoloy is adaptable to hot and cold working, is as readily weldable as low carbon steels, resists corrosion and abrasion, is available in Plates, Sheets, Light Weight Channels, Junior Beams, Junior Tees, Angles, Bars and Jal-Tread Floor Plate.

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH 30, PENNSYLVANIA



Export Allocations Reduced to 850,000 Tons "at the Moment"

Washington

• • • **Initial export requests** for 4,000,000 net tons of steel during the first half of 1946 have already been screened down to about 850,000 tons, to prevent any drastic drain on the domestic economy, CPA officials have told members of the General Steel Products Committee. At a meeting held in New York recently, government officials informed the committee that export requests had been reduced to the minimum amount necessary to meet essential rehabilitation needs in Europe and Africa. This 850,000 tons represents only about 3 pct of expected finished steel production.

Industry members offered complete cooperation in the effort to meet the 850,000-ton requirement, CPA said. At the same time government and industry members also discussed possible ways and means to aid nonintegrated steel producers to obtain supplies of semifinished steel to carry them through the reconversion period.

Help for the nonintegrated mills will be sbject to further consideration, CPA officials reported. There are numerous reports of plans for price relief in the steel industry. None of them has been confirmed. One report relates to a plan to restore an OPA system by which freight rates on steel for small steel companies would be absorbed by the government. Another is that small companies will be offered outright subsidies, a proposal whose legality has been seriously questioned.

There is still another report that bickering exists among government agencies with OPA the target of attack for not granting industrywide price increases at once in order to grease the way for a USW wage increase. Dept. of Commerce officials, however, have denied a report that the department has prepared a study showing that the steel industry as a whole should be granted price increase to meet a wage boost. There is still another report from the rumor factory to the effect that sources in the Dept. of Labor are critical of OPA for not granting industry price increases in steel to compensate for wage increases and to stave off a steel strike. Added to this string of rumors is one that OPA has prepared a further report on steel prices and wages.

These reports may have some foundation back of them, though some of them probably lack substance. But their number and character at least give support to the belief that there are numerous quiet activities among government agencies looking to a solution of the steel labor-price situation.

o o o

New York

• • • **Although the Civilian Production Administration** has indicated to the steel industry that the export demand for 4,000,000 net tons of steel has been screened to 850,000 tons for the next six months, steel officials privately are anxious less this represent a "foot in the door."

The unique feature, it was said, about the tonnage which the steel industry must ship abroad in addition to its regular exports is that it represents requests from "one time buyers."

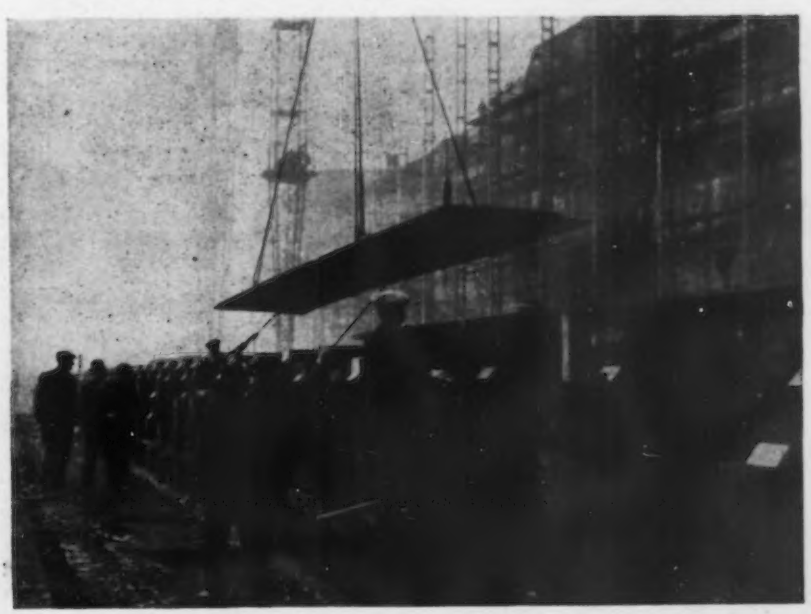
It is understood that the initial tonnage which the CPA has said "represents the requirements over the next six months and covers total requirements 'at this moment'" includes the following breakdown: 187,500 tons of steel bars; 224,500 tons sheets; 133,500 tons structural steel; 211,000 tons of tinplate; and 87,500 tons of wire and wire products.

It is understood that this material which incidentally is far below the amount of inquiries reaching this country is slated to go to the following countries: Continental France (European France and Algiers), China, Ukraine Russia, Denmark, Italy and Australia. Some of these countries, it was pointed out, have not been regular export customers of American steel companies.

The fact that the steel industry continues apprehensive concerning the ultimate aims of the CPA and the State Dept. despite reports that full accord was registered last week is found in the calling of a special meeting which was to have been held Dec. 19 in New York.

The reasons behind the current apprehension is found in the unusual foreign inquiries which daily are reaching this country. It was said that the tonnages mentioned in the initial CPA allocation were so small that they could hardly hope to hold back the pressure for more tonnage. An analysis of the products included in the initial allocation which is to be shipped over the next six months shows that it includes items which

POSTWAR KEEL: *Keel plate being lowered onto the blocks at John Brown's Clydebank Yard, Scotland, where the keel of a new* 14,000 *ton Cunard White Star passenger cargo liner was recently laid.*



are now the tightest in the domestic steel market.

This is especially true with respect to the sheet and tinplate requirements. Tinplate users in this country are clamoring for material and are far behind on receiving deliveries of this item for domestic consumption. Likewise, with practically every American manufacturer weeks or months behind on his steel sheet shipments, it is obvious that the allocation of a quarter of a million tons of sheets for export in addition to regular shipments abroad will cause considerable backfire in this country.

Kuznetsk Pig Iron and Steel Wartime Production Increase Reported

New York

• • • The finally approved plan for the Kuznetsk Metallurgical Combine in western Siberia, next to Magnitogorsk, reported to be the largest metallurgical plant in U.S.S.R., provides for the following major units according to Russian sources:

The Telbess and Temir-Tau iron mines. The Mazulski manganese mines.

Five coke batteries of 55 furnaces each, with a total capacity of 1,800,000 tons of metallurgical coke (total coke output 2,000,000 tons). Of these, four had been completed by 1937, and the fifth was to be completed in 1941. Coke by-products plants.

Two blast furnaces of 821 cubic meters volume each, and two blast furnaces of 1163 cu m volume each.

An openhearth shop of 13 furnaces, twelve having a hearth area of 65.75 sq m each, and one with a hearth area of 77.8 sq m (nominal capacity of latter 300 tons). One openhearth furnace is known to have been completed between 1937 and the outbreak of the war. Its capacity is not known.

A rolling mill department containing a 1150 mm blooming mill (annual capacity 2,150,000 tons), a 900 mm blooming mill (capacity 1,150,000 tons), a rail and girder mill (capacity 700,000 tons), a 500 mm rolling mill (capacity 750,000 tons), a sheetrolling mill (4 to 25 mm, capacity 200,000 tons) and various smaller units.

A heat and power station with a capacity of 108,000 kw of electric power and in addition operating a 32,500 kw air-blower.

Although output data for the years immediately preceding the outbreak of the Soviet-German war are not now available, the following estimates of output from Kuznetsk may be made:

Year	Pig Iron	Steel	Rolled Metal
	thousands of tons		
1936	1,363	1,260	866
1937	1,471	1,609	943
1942	1,617	2,202	1,471
1943	1,706	2,274	1,546
1944	1,736	2,409	1,716
1945		2,460	1,750

It will be noted that pig iron output has increased relatively little. Such increase as has taken place has been the result of better blast furnace utilization. Steel output, on the other hand, has considerably increased. This is not the result of increased openhearth furnace capacity, or at least not of capacity built during the war. *Pravda* of Dec. 9, 1944, states that only two small openhearth furnaces and two 10-ton electric furnaces had been completed in the war years. The increase in steel output openhearth furnace shop either in 1939 or 1940. Another possible explanation may be that output from nearby ferroalloy and electric steel plants is included in overall output.

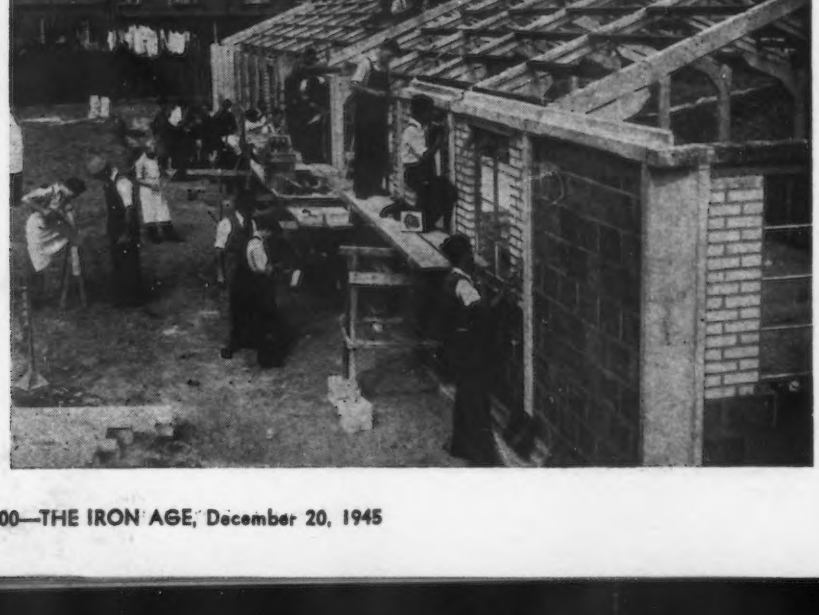
The ferroalloy plant consists of five furnaces, it is reported, the last of which went into operation Dec. 31, 1943. It is stated to be one of the largest such plants in the Soviet Union. The electric steel plant is believed to be the Elektrostal plant, formerly located near Moscow, and evacuated in 1941. It is possible, but it is not certain, that the output of these plants may be included in the output data for Kuznetsk.

In any case, steel output at the Kuznetsk Combine has undergone great changes it is reported. Before the war the plant produced mainly rails and girders and other non-quality steel. Since the war began, however, the plant has begun production of 43 new types of steel, and a number of new types of rolled metal goods. Eighty pct of the steel now produced belongs to these new categories, which include armor plate for the tank and aviation industries.

Before the war, the combine was supplied with manganese from Nikopol and Chiatura. Both of these sources have now been eliminated. Manganese ore from the Mazulski mines (20 pct metal content) now supplies the plant, and output is believed to have increased from 66,000 tons of ore to 300,000 tons. The plant has also begun to supply itself with ferrosilicon.

The Kuznetsk Combine throughout 1943 and 1944 consistently produced above plan. It is therefore of interest to note an article in *Trud* of Dec. 17,

NEVER TOO YOUNG: *English boys at work building a nursery school in the County of Kent. Under the direction of an apprentice master, the lads are to build eight new houses for the Borough of Chatham.*



1944, comparing the operation of the Magnitogorsk and Kuznetsk Combines. It is stated that both plants have overcome the seasonal variation in production which formerly caused considerable drops of output in winter. The Kuznetsk plant operates on a more even basis with respect to quality and quantity of output; it manages its raw material supply better;there is less idle time. In 1943 Kuznetsk open-hearth furnaces had a productivity 22 pct greater than those of Magnitogorsk, although renovation work at the latter plant eliminated this difference in 1944. Thus in 1944 average daily output at Kuznetsk increased only "tens of tons," while at Magnitogorsk it increased "many hundreds of tons." Equipment at Kuznetsk appears to be better used, but to be less up-to-date. The output of basic productive labor appears to be greater at Kuznetsk (1.1 hr of labor by blast furnace personnel per ton of pig iron at Magnitogorsk compared to .88 hours at Kuznetsk), but if all labor is taken into account, additional repair, maintenance and administrative costs at Kusnetsk are sufficient to turn the balance the other way (taking all labor expenditures into account, 11.9 manhours are required to produce a ton of pig iron at Mangitogorsk, compared to 21.3 manhours at Kuznetsk). The implication of the article appears to be that while the Kuznetsk plant is "eminently reliable," it is not as up-and-coming as the Magnitogorsk Combine.

Outlines Modernization Plans for Steel Firm

London

• • • **Postwar modernization** envisaged by United Steel Companies, Ltd., has been outlined by Sir Walter Benton Jones in his address at the firm's annual general meeting as including much rolling mill re-equipping, and the alteration of war built facilities to peacetime use. An alloy steel works built at Distington during the war is included in the program, and is destined to be used in the production of ingot molds for use by the firm and for sale.

Other products which the firm hopes to put in production for its own use and outside sale are large American-type mine cars, and mining and transport equipment for mines.

According to the report the firm's rolling mills at Cumberland are in the process of modernization, but those in the Sheffield group at Samuel Fox and Co. are considered adequate for the present, and are not to be replaced. At the firm's Steel, Peech & Tozer works at Sheffield the railway wheel shop is being rearranged and modernized, with new equipment to be added. Long delayed furnace repairs in this plant foreshadow a drop in steel output at this plant for the next twelve to eighteen months.

The firm's Appleby-Frodingham works at Scunthorpe will see extensive work including expansion of coke making to replace that amount that has been in the past purchased in the open market. Of three complete blast furnace works now in operation, one is destined to be completely replaced by the construction of two new modern blast furnaces and a duplication of the coke oven works in the newest of the works.

Of the firm's two steel making plants at this site, the Appleby plant is modern, and has in recent years been extended. The Frodingham works is old, and is scheduled for replacement with a new plant. The new establishment is to be built on a site adjacent to the newest of the firm's blast furnace plants. A structural mill also at Frodingham is to be modernized, and a fabrication plant for construction steels is to be enlarged.

Canadian 1945 Export Trade Shows Decline Compared with 1944

Ottawa

• • • **Canada's export** trade for October valued at $227,901,000 dropped 27.4 pct from the $313,962,000 in the corresponding month of last year. Export of direct war materials in October dropped to $46,805,000 from $137,558,000 in October 1944, a loss of 66 pct. The aggregate of Canadian exports for the first ten months this year was $2,744,867,000 and compares with $2,860,583,000 for the same period of 1944.

Exports of iron and steel and their products for October declined 69 pct to $20,200,000 from $65,324,000 in October 1944. For the ten months ending with October, exports of iron and steel and their products were valued at $520,569,000 against $657,850,000 in the like period of 1944. In this group, motor vehicles and parts fell from $40,035,000 in October last year to $8,922,000 for October this year and in the ten months from $368,351,000 to $333,173,000.

Canadian merchandise exports to the United States in October were valued at $88,438,000 compared with $123,039,000 for the like month last year, while for the ten months this year they amounted to $1,006,815,000 down from $1,056,028,000 a year ago. Exports to the United Kingdom in October were valued at $56,321,000 compared with $112,639,000 in October 1944, and in the ten months ending with October to $844,472,000.

COKE BATTERY: *A restored coke battery at the Nazi-wrecked coke and chemical plant in Mariupol, Russia, where rehabilitation work is in full swing.*

Buffalo Industry, Transportation Are Paralyzed Under 50 In. of Snow

Buffalo

• • • Heavy industries of East and South Buffalo and communities along Lake Erie's South Shore were paralyzed by a series of freak blizzards that covered the section with as much as 50 in. of snow over the last weekend and tied transportation in a knot.

A continuation of the record breaking snowfall Monday afternoon made it impossible for workers to get to their jobs as streets and highways were blocked by huge drifts and also tied up railroad yards and sidings.

Food, cots and blankets were rushed in to hundreds of workers in plants who were working Saturday when the storm began and were still on the job Monday and Tuesday. Many went 30 hr or more without sleep.

The Bethlehem Steel Co.'s Lackawanna Works in the heart of the storm belt suspended all steel production early Tuesday. The five active blast furnaces at the plant were banked and the last 27 openhearths were tapped shortly after midnight. Plans were announced for recharging the steel furnaces on Wednesday, weather permitting, and twelve hundred employees were housed at the works Monday night.

A cold wave accompanying the blizzard that plunged the mercury close to the zero mark added to difficulties by freezing railroad switches.

The Republic Steel Co.'s steel output was cut to about 65 pct of the plant's capacity. Although maintaining operation of three blast furnaces, the Hanna Furnace Co. was forced to stockpile production because of the rail blockade.

Most of the plants affected were planning to resume full operations on Tuesday or Wednesday if conditions were favorable.

Among those closed entirely on Monday, except for some maintenance work, were Worthington Pump and Machinery, American Magnesium, Symington-Gould at Depew.

Production in the North Buffalo and Black Rock sections, Tonawanda, Kenmore and other communities to the North, which had a relatively light snowfall, was curtailed by workers staying away for various reasons, including inability to get through the storm-blocked area. Absenteeism ranged from 10 to 90 pct.

South Buffalo and Lackawanna were hardest hit by the storm, while Dunkirk had 16 in.

Airport operations were suspended on Saturday and drifted runways and zero visibility still prevented planes from landing late Monday.

Traffic in downtown Buffalo began to move moderately late Monday and snowfighting equipment was rushed from Erie, Pa., Toronto, Ont., and Syracuse, and Gov. Thomas E. Dewey had ordered mobilization of the Motor Transport Co. and Scout Car Platoon of the Fourth Brigade, New York Guard, to aid in the battle. Railroads had managed to regain nearly normal passenger train operations but freight traffic was still badly snarled.

Cites Violations In Pig Iron Industry

Washington

• • • To assure equitable distribution of pig iron, users of the metal in the northeastern states have been advised by CPA to hold their purchases within the 30-day inventory restrictions prescribed in Government regulation.

CPA officials said that there were also indications of inventory violations in other sections of the country and that stricter controls will be imposed unless pig iron consumers abide by the inventory restrictions in PR No. 32. The decline in pig iron production since June has also contributed to the present situation, it was reported, with officials announcing that pig iron production totaled 2,960,000 tons in October against 3,690,866 tons in September, 3,719,409 tons in August and 4,221,683 tons in July.

To avoid the necessity for a return to full allocation of pig iron in New England, Government members and industry men agreed on the following moves:

(1) To call the attention of all pig iron consumers in the New England area to the provisions of PR 32 which limits inventories to a 30 day's supply. Advise all consumers that if their inventories are in excess of the 30-day limitation, they cannot accept any deliveries if such acceptances would bring inventories over a 30 days supply.

(2) CPA plans to supply all pig iron producers with a list of companies in violation of inventory restrictions and to instruct these producers to withhold shipments to such pig iron consumers who are in violation.

(3) Until the present situation clarifies, New England consumers will be required to report their monthly consumption of pig iron and inventories at the end of each month.

HOUSEWIFE'S DREAM: *Automatic electric dishwashers on the assembly line at the Edison General Electric (Hotpoint) Appliance Co., Chicago. The machine performs eight operations, starting with a spray, then rinsing and washing at one touch of a button without the use of soap. A heating element comes on automatically to dry the dishes after washing, and then the machine turns itself off. The selling price has been cut 30 pct below the 1942 price.*

Diamond Orders Revoked

Washington

• • • CPA has announced that industrial diamonds have been freed from federal distribution controls. This relaxation has been effected in this country through the revocation of order M-109. Restrictions on importation of diamonds in the import order, M-63, are expected to be eliminated shortly. However, overall domestic inventory controls in PR 32 are still applicable.

AMERICAN IRON AND STEEL INSTITUTE

Production of Open Hearth, Bessemer and Electric Steel Ingots and Steel for Castings

YEAR 1945

Based on Reports by Companies which in 1944 made 97.9% of the Open Hearth, 100% of the Bessemer and 86.7% of the Electric Ingot and Steel for Castings Production

Period	Estimated Production—All Companies								Calculated weekly production, all companies (Net tons)	Number of weeks in month
	OPEN HEARTH		BESSEMER		ELECTRIC		TOTAL			
	Net tons	Percent of capacity	Net tons	Percent of capacity	Net tons	Percent of capacity	Net tons	Percent of capacity		
January	6,468,815	90.5	379,062	76.0	358,346	77.3	7,206,223	88.8	1 626,687	4.43
February	5,967,842	92.4	347,227	77.1	339,520	81.1	6,654,589	90.8	1,663,647	4.00
March	6,927,377	96.9	398,351	79.8	382,237	82.4	7,707,965	95.0	1,739,947	4.43
1st Quarter	*19,364,034*	*93.3*	*1,124,640*	*77.6*	*1,080,103*	*80.2*	*21,568,777*	*91.6*	*1,677,199*	*12.86*
April	6,541,097	94.4	372,952	77.2	377,877	84.1	7,291,926	92.8	1,699,750	4.29
May	6,663,577	93.2	402,100	80.6	386,075	83.3	7,451,752	91.8	1,682,111	4.43
June	6,129,266	88.5	379,807	78.6	333,217	74.2	6,842,290	87.1	1,594,939	4.29
2nd Quarter	*19,333,940*	*92.1*	*1,154,859*	*78.8*	*1,097,169*	*80.6*	*21,585,968*	*90.6*	*1,659,183*	*13.01*
1st 6 Months	*38,697,974*	*92.7*	*2,279,499*	*78.2*	*2,177,272*	*80.4*	*43,154,745*	*91.1*	*1,668,139*	*25.87*
July	6,318,463	88.6	381,832	76.7	286,713	61.9	6,987,008	86.3	1,580,771	4.42
August	5,171,925	72.3	347,088	69.5	217,363	46.9	5,736,376	70.7	1,294,893	4.43
September	5,435,358	78.7	352,847	73.2	195,156	43.5	5,983,361	76.3	1,397,982	4.28
3rd Quarter	*16,925,746*	*79.9*	*1,081,767*	*73.1*	*699,232*	*50.9*	*18,706,745*	*77.8*	*1,424,733*	*13.13*
9 months	*55,623,720*	*88.3*	*3,361,266*	*76.5*	*2,876,504*	*70.4*	*61,861,490*	*86.6*	*1,586,192*	*39.00*
* October	5,146,370	72.0	242,122	48.5	209,290	45.1	5,597,782	69.0	1,263,608	4.43
† November	5,692,518	82.2	358,639	74.2	195,602	43.6	6,246,759	79.5	1,456,121	4.29
December										4.42
4th Quarter										*13.14*
2nd 6 months										*26.27*
Total										52.14

Note—The percentages of capacity operated are calculated on weekly capacities of 1,614,338 net tons open hearth, 112,658 net tons Bessemer and 104,640 net tons electric ingots and steel for castings, total 1,831,636 net tons; based on annual capacities as of January 1, 1945 as follows: Open hearth 84,171,590 net tons, Bessemer 5,874,000 net tons, Electric 5,455,890 net tons.

YEAR 1944

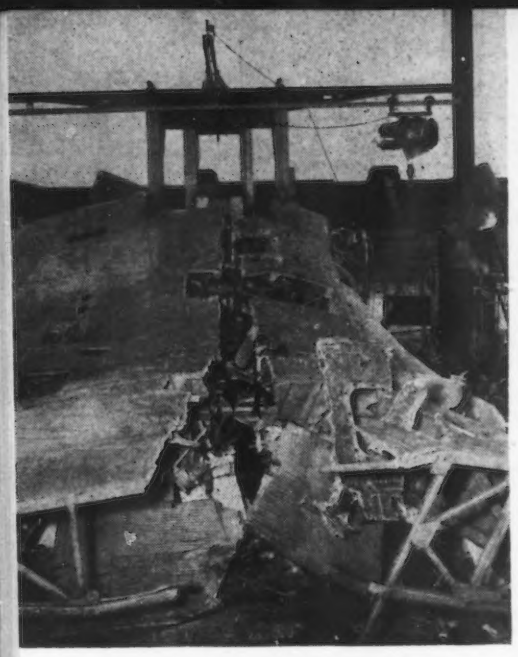
Based on Reports by Companies which in 1944 made 97.9% of the Open Hearth, 100% of the Bessemer and 86.7% of the Electric Ingot and Steel for Castings Production

Period	Estimated Production—All Companies								Calculated weekly production, all companies (Net tons)	Number of weeks in month
	OPEN HEARTH		BESSEMER		ELECTRIC		TOTAL			
	Net tons	Percent of capacity	Net tons	Percent of capacity	Net tons	Percent of capacity	Net tons	Percent of capacity		
January	6,770,423	97.2	439,551	85.4	382,629	84.4	7,592,603	95.7	1,713,906	4.43
February	6,410,914	98.5	409,781	85.2	373,314	88.1	7,194,009	97.0	1,737,683	4.14
March	6,977,466	100.1	455,368	88.5	393,423	86.8	7,826,257	98.6	1,766,649	4.43
1st Quarter	*20,158,803*	*98.6*	*1,304,700*	*86.4*	*1,149,366*	*86.4*	*22,612,869*	*97.1*	*1,739,451*	*13.00*
April	6,789,422	100.6	437,472	87.8	366,794	83.5	7,593,688	98.8	1,770,090	4.29
May	6,879,253	98.7	437,444	85.0	385,879	85.1	7,702,576	97.1	1,738,730	4.43
June	6,463,049	95.8	419,699	84.2	351,509	80.1	7,234,257	94.1	1,686,307	4.29
2nd Quarter	*20,131,724*	*98.4*	*1,294,615*	*85.6*	*1,104,182*	*82.9*	*22,530,521*	*96.7*	*1,731,785*	*13.01*
1st 6 months	*40,290,527*	*98.5*	*2,599,315*	*86.0*	*2,253,548*	*84.7*	*45,143,390*	*96.9*	*1,735,617*	*26.01*
July	6,743,812	96.6	415,543	80.9	339,032	74.6	7,498,387	94.3	1,696,468	4.42
August	6,715,835	95.9	429,672	83.5	353,406	77.6	7,498,913	94.1	1,692,757	4.43
September	6,501,944	96.1	398,058	80.1	335,109	76.2	7,235,111	94.0	1,690,446	4.28
3rd Quarter	*19,961,591*	*96.2*	*1,243,273*	*81.5*	*1,027,547*	*76.2*	*22,232,411*	*94.1*	*1,693,253*	*13.13*
9 months	*60,252,118*	*97.7*	*3,842,588*	*84.5*	*3,281,095*	*81.8*	*67,375,801*	*96.0*	*1,721,405*	*39.14*
October	6,860,921	98.0	420,105	81.6	339,859	74.7	7,620,885	95.6	1,720,290	4.43
November	6,572,454	97.0	403,908	81.0	302,357	68.6	7,278,719	94.3	1,696,671	4.29
December	6,678,460	95.6	373,322	72.7	314,388	69.2	7,366,170	92.6	1,666,554	4.42
4th Quarter	*20,111,835*	*96.9*	*1,197,335*	*78.4*	*956,604*	*70.8*	*22,265,774*	*94.2*	*1,694,503*	*13.14*
2nd 6 months	*40,073,426*	*96.5*	*2,440,608*	*80.0*	*1,984,151*	*73.5*	*44,498,185*	*94.2*	*1,693,878*	*26.27*
Total	80,363,953	97.5	5,039,923	83.0	4,237,699	79.0	89,641,575	95.5	1,714,644	52.28

Note—The percentages of capacity operated are calculated on weekly capacities of 1,572,755 net tons open hearth, 116,182 net tons Bessemer and 102,350 net tons electric ingots and steel for castings, total 1,791,287 net tons; based on annual capacities as of Jan. 1, 1944 as follows: Open hearth 82,223,610 net tons, Bessemer 6,074,000 net tons, Electric 5,350,880 net tons. Beginning July 1, 1944, the percentages of capacity operated are calculated on weekly capacities of 1,580,042 net tons open hearth, 116,182 net tons Bessemer and 102,757 net tons electric ingots and steel for castings, total 1,798,981 net tons; based on annual capacities as follows: Open hearth 82,604,600 net tons, Bessemer 6,074,000 net tons, Electric 5,372,150 net tons.

* Revised.
† Preliminary figures, subject to revision.

Navy Disposal of Aircraft Aluminum



PERFORMANCE: *This photograph shows the performance of the salvage program is effective.*

Washington

• • • One of the most comprehensive programs for the disposal of surplus aircraft aluminum scrap, calling for the production of about 15,000,000 lb of the best quality secondary aluminum ingot practicable, has been instituted by the Navy Dept.

The program calls for the installation of standard melting units consisting of sloping hearth reverberatory furnaces with a capacity of 8,000 to 10,00 lb each at Glass A naval air activities located at Jacksonville, Fla., and Alameda and San Diego, Calif. Thirty-five pound ingots will be turned out at these facilities, which will be in operation shortly after Jan. 1.

Open pot furnaces, now in operation at Miami, Fla., and Norfolk, Va., will continue to produce an indiscriminate type of aluminum ingot.

Quantities of aluminum scrap not large enough to warrant the installation of melting facilities located throughout the country will be disposed of as scrap rather than ingot.

The cost of the program is being borne by the Navy Dept., but proceeds from sales will go into the general fund of the Treasury. A tentative floor price of 6¢ per lb has been set by the Navy, in accordance with Surplus Property Administration Reg. No. 12.

The program is under the direction of Lt. Stanley H. Brown, USNR, who was formerly associated with the National Smelting Co., Cleveland, and Basic Magnesium, Inc., Las Vegas, Nev.

In the improved type of reverberatory furnaces, a sloping hearth with a metal bath will be provided which will permit the production of ingot in batches or heats of known analyses. The ingots from this "heat" system will be identified systematically to agree with correspondingly identified analytical records. As a result, it is expected secondary ingot may be offered for sale within certain impurity limitations.

Strong emphasis will be centered on this latter method, since the advantages from a metallurgical viewpoint are numerous and it includes practices adhered to by commercial smelting organizations.

Modifications will be made to existing sloping hearth facilities to create a commercially accepted standardized aluminum melting procedure within the naval organizations.

In preparing scrap for furnace charging the Navy has instructed its operators to apply particular emphasis to the segregation of scrap bearing the four most important impurities—lead, iron, magnesium and zinc.

To date, the Navy reports, the most successful method of scrap preparation is the use of the oxy-acetylene torch. In spite of this costly method of preparation it has proven economically sound. With the furnace doors of the Navy melting furnaces being increased in size it follows that more pounds of scrap will be prepared for charging at a relatively lower rate. However, the acceptance of gas burning as a "one and only" is not encouraged by the Navy, and is not mandatory. A new version of the cable cutting method appears to offer the most promising new procedure thus far.

The performance as indicated by the photographs (figs. A and B) is very effective. A thorough investigation is planned in the very near future. The equipment required is simple in nature and should be available in surplus stores at a low cost. It is possible that combination of the two methods will be eventually instituted.

Lead looms as the most detrimental single impurity, and will be salvaged for its own scrap value wherever possible. The maximum quantity of lead permitted by most specifications is 0.05 pct with wrought alloys requiring even lower amounts.

Iron, because of its prevalence, is the second most important impurity and operators have been instructed to keep the quantity of iron going into the furnaces at a minimum. The sloping hearth furnaces have particular advantages in the removal of iron, since their purpose and theory is to eliminate iron by literally sweating the aluminum away from the iron or steel contaminates.

In some instances aircraft manufacturing specifications demand the use of sheet aluminum bearing a high zinc content. Zinc beyond 0.25 pct maximum in the secondary wrought alloy attempted by the Navy will not be tolerated.

Of the four impurities, magnesium stands last on the list. The magnesium in Navy produced ingot is expected to fall in excess of 1 pct. This because of the preponderance of 24S dural used in aircraft production. The specification on this alloy requires a maximum of 1.50 pct magnesium. Nearly all wrought alloys contain as much as 0.75 pct. A metal study of secondary ingot produced by the Navy indicates a magnesium content of approximately 1.25 pct.

It is not probable that the Navy will make any attempt to remove magnesium in excess of 0.75 pct, since the operation would involve a rather complicated process requiring special equipment and training of personnel. The operation of bubbling chlorine gas through molten aluminum at 1500° F embodies many production delaying factors not desired by the Navy in the production of low cost ingot.

Segregated solids declared surplus and scrap such as propellers, rivets, sheet, pistons, forgings or castings will not be melted but will be held for local sale or shipment in carload lots upon receipt of orders from RFC.

Metals foreign to aluminum including copper cable, steel control cable, wing hinge forgings, armor plate, firewalls, batteries, and brass and bronze fittings and bushings will be removed as will materials other than metals.

Aluminum will also be sweated from aircraft engine cylinders. The metal derived from this operation

Scrap to Produce 15 Million lb of Secondary Metal . . .

By E. J. HARDY

o o o

will be of a high quality alloy if proper operating technique is exercised. Very low iron content will be obtained if the metal is not melted from the steel insert.

Satisfactory results have been obtained by charging a quantity of cylinders into the furnace and heating the pile of cylinders with a low, oxidizing flame until the metal starts to flow. At this point, the side access doors are opened and the individual cylinders are picked up and dropped on the hearth of the furnace. The aluminum readily falls from the red hot insert in such a state as to insure metal quality and high recovery when it flows into the holding bath.

In general, the following guides on operating temperatures will be used by furnace operators:

(1) Iron pot: 1200-1300° F.

(2) Sloping hearth: To be operated through the association of color of refractories in furnace walls and temperature.

(3) Holding bath: 1200-1300° F. Higher temperatures will result in gas and oxide affecting metal recovery.

In regard to sampling, the Navy has instructed its operators to thoroughly mix or agitate the bath of metal for 15 min just prior to tapping out. The sample is poured into a cast iron mold of size and shape best suited to the requirements of the laboratory performing the analytical work. The sample is then stamped with steel dies showing the number corresponding to the heat number stamped on the ingots, linking the analytical record to the particular heat involved.

From a standpoint of chemical analysis, the Navy produced ingot will fall probably into four broad chemical classifications. The adoption of the Navy storekeeping plan is linked very closely to the analytical records maintained since the analysis of each heat must be determined before the metal can be assigned to one of the four classifications.

Although Class "D" is the lowest grade ingot and will have included in it various sorts of metal, an analytical record is maintained on each individual heat or lot.

By the same token, when an activity is faced with a run of uniform segregated material such as 3-S fuel tanks or aircraft engine cylinders, the metal is to be segregated, stockpiled and proper identification made.

The need for a concentrated fluxing procedure is minimized in the sloping hearth furnace. Because of the high surface tension of the skim in the sloping hearth as compared to the molten aluminum, an acceptable oxide free ingot will be produced. The skim raked from the access doors is dry and the quantity of metal to be recovered by introducing additional operations would not warrant the expenditure or additional work involved.

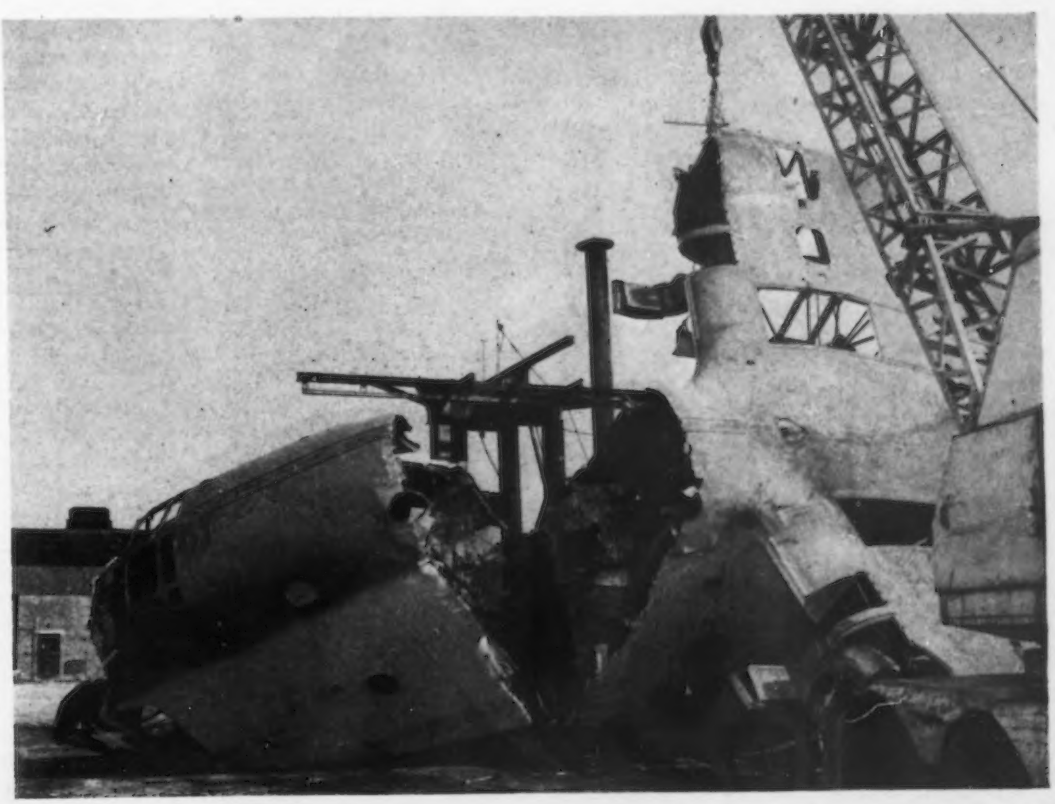
Activities employing the sloping hearth plus holding bath will produce ingot of a superior quality by fluxing the metal in the holding pool with chloride salts. In addition, 5 pct of cryolite is advised.

Sales of the ingot produced will be by the Navy Materials Redistribution and Disposal Administration or in some cases the producing activity itself. Shipment will be made in accordance with the contract which will call for metal of the classifications stored at the shipping activity.

o o o

SECONDARY METAL: *Navy Dept. officials expect at least* 15 *million lb of secondary aluminum to be obtained when the program is completed.*

o o o



Superseniority Ruling Sought By Union and Western Cartridge Co.

East Alton, Ill.

• • • Another move has been taken in an effort to define the postwar seniority status of veterans with an agreement between Western Cartridge Co., its parent organization Olin Industries, Inc., and a local of the AFL-affiliated Union of Mine, Mill and Smelter Workers, to petition in Federal Court for a declaratory judgment asking for an interpretation of the section of the G.I. Bill of Rights promising veterans their pre-induction jobs.

The agreement to file the petition was made after a three week strike at the Western Cartridge Co. plant at East Alton, Ill., beginning on Sept. 24. The agreement provides for right of appeal to a higher court by either company or union, to which both parties will abide unless subsequently reversed or modified by legal procedure.

An honorably discharged war veteran who was reinstated by the company in his prewar job on Jan. 23, 1945, was the subject of the union's walk-out eight months later, it was revealed by John M. Olin, president of the parent company. The veteran was re-hired under General Hershey's interpretation which protects a veteran in his job for one year from the date of his re-instatement, according to Mr. Olin. "At the time of the re-instatement no other employee was displaced or otherwise affected," Mr. Olin said.

"During the period following the end of the war when the termination of contracts for ammunition obliged the company to reduce the working force to a commercial production basis, the company found that this veteran had the least seniority in his group. Contending that the veteran was protected by the G. I. Bill of Rights, the company retained the veteran. To make way for the veteran, a non-veteran, the next youngest man in seniority, was offered a job in the same department but at a lower rate of pay. This decision was accepted by the non-veteran who, under collective bargaining procedure, applied for and was given a job in another classification which pays exactly the same rate as he would have received in his former job.

"During the grievance hearing the union contended that if the veteran desires to file a claim under the bill he must do so on his own initiative. The union also insisted it would not follow arbitration procedure and demanded that the veteran be laid off.

"Subsequently the union agreed to the company's offer to restore the civilian to his former job with back pay, to retain the veteran pending final determination of the case and to submit the entire matter for arbitration by the U.S. Dept. of Labor or any other agency the union might recommend to settle the issue, the decision to be final and binding upon both parties."

Suggest Premium Price For Steel Producers

Washington

• • • With OPA economists standing firm in their contention that industry-wide price relief must wait until fourth quarter statements are filed and CPA officials even more reluctant to reimpose allocation controls, another proposal for relief of non-integrated steel producers came to the fore this week.

It has been suggested that provisions of the Premium Price Plan, which was designed to subsidize nonferrous producers, be utilized to ease the plight of the smaller steel producers. The act expires June 30, 1946.

The proposal would have the RFC purchase quantities of semi-finished steel, at prevailing ceiling prices and in turn make them available to the non-integrated mills at a lower price.

The basis for such an arrangement, according to an informed source, is a "catch-all" clause in the Premium Price Plan.

Successful operation of such an arrangement would of course depend on whether supplies of needed steel were available. In view of the present situation which may worsen before it improves, prospects of RFC securing steel would be no brighter than that of the smaller producers themselves unless some form of limited priorities assistance was invoked. This might bring about the very situation CPA is trying to avoid.

Meanwhile, OPA looks to CPA for action to relieve the tangled steel distribution problem and, at the same time, CPA would have OPA relax price restrictions on the theory that in a choice between mild inflation or a steel shortage our economy could more readily withstand the former.

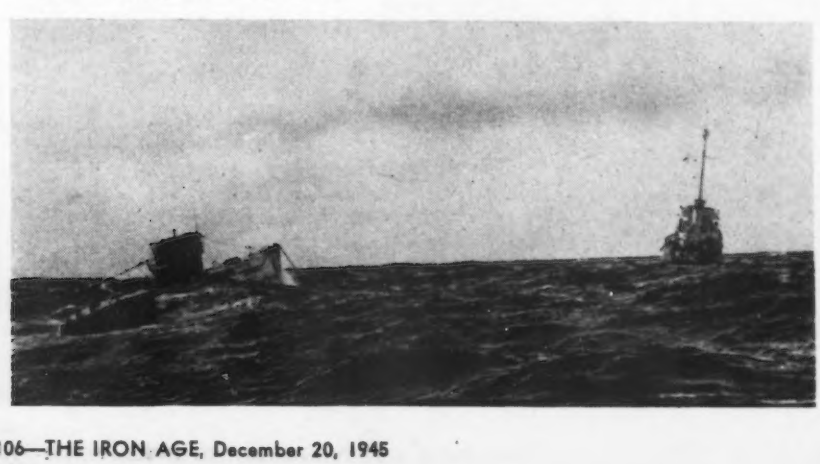
Tin Permitted In Tubes, Body Solder

Washington

• • • CPA announced Dec. 18 that the tin order M-63 has been amended to permit use of tin for body solder in manufacture of passenger automobiles. The new order establishes the new solder tin content at 4 pct and provides that it must be obtained through recovery of tin scrap.

The order also provides that secondary tin may be used in manufacture of collapsible tubes and metal closures for jars. A slight increase was also granted in quantities of tin authorized for use in manufacture of kitchen utensils.

SINKING SUB: *"Deadlight" is the Naval term for the operation of sinking German U-Boats in the North Atlantic. A total of 110 subs are to be disposed of in this manner. The operation is particularly hazardous at this time of year when gales are frequent.*



Murray Says Fact-Finding Is Utterly Futile, Deceptive and Aimless

Washington

• • • **The Administration's proposed** fact-finding legislation now stymied in congressional committees until after the Christmas recess may "die on the vine" in spite of pressure from the White House.

The Senate and House Labor Committees decided to hold extended hearings after the Christmas recess. Tentative plans call for a recess from Dec. 21 until Jan. 14. It apparently is the hope of both House and Senate Committee members that pending strikes such as the GM strike will be settled soon and threatened strikes such as in steel can be avoided and render legislation unnecessary.

Following action by the Senate committee which voted for four weeks additional hearings, the House Labor Committee rejected a motion for immediate consideration with a view to reporting it to the House floor. It was also decided to broaden the scope of the hearings to include investigation of the entire labor-management picture. Both committees expect to call a much larger number of witnesses than originally anticipated. Steel and other industrialists probably will be called to testify.

Meanwhile, it is reliably reported that Mr. Truman is considering a radio address in which he would outline his views on dispute settling machinery and possibly make another appeal for enactment of a stronger Full Employment Bill. The House "employment-production" version passed Dec. 14 is considerably watered down from the form originally requested by the Administration.

On the House side, Secretary of Labor Lewis Schwellenbach was the only committee witness to give unqualified endorsement of the President's fact-finding proposal. Leaders of the major labor organizations bitterly opposed it, while representatives of the National Association of Manufacturers and the U. S. Chamber of Commerce suggested major changes.

Testifying before the House committee, CIO President Philip Murray called the proposal futile, deceptive and aimless and expressed regret over what he termed the Administration's lack of "forthright and courageous action." Mr. Murray declared that there was no need for fact-finding or cooling off periods. Voluminous data prepared by the Dept. of Commerce and OPA but never released publicly, he stated, precluded the need for further fact finding.

Rep. Robert Ramspeck, D. of Ga., was critized by Mr. Murray for having pressed for quick action on the bill. In a sharp exchange, Mr. Ramspeck charged that Mr. Murray did not want to do anything about the industrial unrest over the country. He warned that "if the steel industry shuts down on top of the automobile strike, we may get along about the middle of January some legislation we both wouldn't like."

As the United Steelworkers of America squared off for the impending Jan. 14 strike, Lee Pressman, CIO general counsel, in a letter to Mr. Murray handed down an opinion conveniently slanted to permit USW to evade its obligation. Mr. Pressman declared the steel company's contention that a strike would violate outstanding collective bargaining agreements was "absolutely without merit." He pointed out that the issue of a general wage increase could be reopened for collective bargaining while the agreement was in force, provided a change in wage policy took place.

Discusses Atomic Power

New York

• • • **At the Atomic Energy Symposium** held here recently in conjunction with the golden anniversary, National Assn. of Manufacturers, Congress of American Industry, nine of the principal academic and industrial scientists who developed the atomic bomb agreed that it is technically possible to build an atomic power plant at present. Immediate hope of running automobiles or airplanes by atomic power was declared wishful thinking, not because of the power of the atom but because of the large and heavy shields necessary to protect human beings against radioactive emanations. The smallest moving power plant capable of using present energy would be a steamship.

STRIKE-HAPPY: *A picket line of CIO auto workers on strike march around the General Motors building in Detroit, in a mass demonstration. The building across the street bearing the slogan "We Fight Today For a Better Tomorrow" is UAW-CIO headquarters.*

Volta Redonda Mill Production Delayed

New York

• • • **Col. Sylvio R. Oliveira** has recently become president of the Brazilian National Steel Co. whose mill at Volta Redonda is reaching completion. Col. Oliveira, formerly vice-president, had been in charge of the company's activities in the United States. This is now being handled by Mr. David Moretsohn, attorney-in-fact. The company's office here is at 570 Lexington Ave., New York. Col. Oliveira is now stationed at the company's main office at Rio de Janeiro. Col. Macedo Soares has been named vice-president and technical director. Col. Soares is stationed at the plant in Volta Redonda.

Predicted production of pig iron and steel during the year has not materialized as anticipated largely because of the need to assure supplies adequate for continuous production when once it begins. Meanwhile, although practically all plant facilities are completed, it is reported that stockpiles of raw materials are being assembled.

Metals Company Expands

Oakland, Calif.

• • • **California Metals Co.** succeeds to and takes over the activities of the California Scrap Iron Corp. effective January 1. Main headquarters are in Oakland with branches in San Francisco and Pittsburg, California.

The scrap division will continue as the principal supplier for the Columbia Steel Co. in central and northern California. The company will continue to expand its operations in warehousing and brokerage of steel products and nonferrous materials.

The new company is a partnership owned and controlled by Marshall Shapiro and Henry Shapiro.

Offer Extrusion Plant

Washington

• • • **A newly constructed aluminum extrusion plant with a rated capacity of 10 million lb a year, readily adaptable for use as a structural steel fabricating plant or to other heavy industrial use, is offered for sale or lease, the RFC has announced.** Formerly operated by Extruded Metals Defense Corp., the property is near Grand Rapids, Mich. The buildings contain a total floor area of about 296,000 sq ft.

The plant was constructed primarily for the production of high strength aluminum rod, bars, shapes and tubing, and brass rods.

Steel Production and Shipments for October

AMERICAN IRON AND STEEL INSTITUTE
CAPACITY, PRODUCTION AND SHIPMENTS

Period OCTOBER - 1945

Steel Products	Number of companies	Items	Maximum Annual Potential Capacity Net Tons	Current Month: Production: Net Tons	Current Month: Production: Per cent of capacity	Current Month: Shipments (Net Tons): Total	Current Month: Shipments (Net Tons): To members of the industry for conversion into further finished products	To Date This Year: Production: Net Tons	To Date This Year: Production: Per cent of capacity	To Date This Year: Shipments (Net Tons): Total	To Date This Year: Shipments (Net Tons): To members of the industry for conversion into further finished products
Ingots, blooms, billets, tube rounds, sheet and tin bars, etc.	51	1	xxxx	xxxx	x.xx	271,447	132,095	xxxx	xxx	6,175,813	1,821,927
Structural shapes (heavy)	11	2	9,580,550	317,229	404	333,106	xxxx	2,895,204	38.5	2,903,864	xxxx
Steel piling	4	3		11,610		8,606	xxxx	180,105		179,855	xxxx
Plates (sheared and universal)	27	4	17,841,320	392,340	25.9	415,032	40,064	6,351,575	42.7	6,230,403	483,356
Skelp	6	5	xxxx	xxxx	xxx	47,398	22,541	xxxx	xxx	627,019	323,479
Rails—Standard (over 60 lbs.)	4	6	3,669,000	181,251	58.1	189,905	xxxx	1,863,274	61.0	1,843,736	xxxx
—All other	5	7	512,000	17,912	41.2	13,313	xxxx	139,897	32.8	142,088	xxxx
Splice bars and tie plates	12	8	1,745,960	70,230	47.3	70,481	xxxx	637,743	43.9	657,945	xxxx
Track spikes	10	9	349,400	14,342	48.3	14,828	xxxx	129,883	44.6	134,972	xxxx
Hot Rolled Bars—Carbon	38	10	xxxx	616,623	xxx	523,328	76,242	7,005,951	xxx	5,575,501	869,739
—Reinforcing—New billet	13	11	xxxx	74,189	xxx	72,251	xxxx	572,993	xxx	581,113	xxxx
—Rerolled	14	12	xxxx	9,263	xxx	8,668	xxxx	64,354	xxx	70,090	xxxx
—Alloy	24	13	xxxx	164,090	xxx	126,340	12,499	2,292,618	xxx	1,672,019	197,818
—Total	46	14	22,381,700	864,165	45.4	730,587	88,741	9,935,916	53.3	7,898,723	1,067,557
Cold Finished Bars—Carbon	23	15	xxxx	120,333	xxx	118,723	xxxx	1,408,997	xxx	1,399,501	xxxx
—Alloy	25	16	xxxx	24,432	xxx	20,914	xxxx	328,445	xxx	293,354	xxxx
—Total	32	17	3,015,910	144,765	56.5	139,637	xxxx	1,737,442	69.2	1,692,855	xxxx
Tool steel bars	17	18	273,010	8,454	36.4	9,161	xxxx	106,292	46.7	106,140	xxxx
Pipe & Tubes—Butt weld	16	19	2,232,520	129,966	68.5	134,631	xxxx	1,292,078	69.5	1,267,421	xxxx
—Lap weld	9	20	830,200	30,791	43.7	32,367	xxxx	424,988	61.5	439,134	xxxx
—Electric weld	11	21	1,570,900	70,751	53.0	62,739	xxxx	838,995	64.1	745,052	xxxx
—Seamless	16	22	3,377,700	195,152	68.0	148,075	xxxx	2,407,566	85.6	1,905,355	xxxx
—Conduit (cap. & prod. incl. above)	7	23	xxxx	xxxx	xxx	7,919	xxxx	xxxx	xxx	71,787	xxxx
—Mech. tubing (cap. & prod. incl. above)	11	24	xxxx	xxxx	xxx	40,485	xxxx	xxxx	xxx	579,790	xxxx
Wire rods	27	25	7,266,670	390,889	63.3	107,702	39,448	3,747,643	61.9	1,090,134	376,804
Wire—Drawn	41	26	5,664,690	301,908	62.7	172,222	9,448	2,915,807	61.8	1,726,242	97,802
—Nails and staples	19	27	1,253,360	53,322	50.1	51,141	xxxx	496,163	47.5	500,215	xxxx
—Barbed and twisted	15	28	539,610	21,068	46.0	19,407	xxxx	195,978	43.6	194,961	xxxx
—Woven wire fence	16	29	1,113,860	35,557	37.6	34,434	xxxx	305,861	33.0	303,874	xxxx
—Bale ties	12	30	149,700	6,587	51.8	6,920	xxxx	61,761	49.5	68,715	xxxx
Black Plate—Ordinary	9	31	xxxx	xxxx	xxx	76,346	596	xxxx	xxx	464,919	4,082
—Chemically treated	8	32	465,000	15,336	38.8	13,751	xxxx	99,946	25.8	91,050	xxxx
Tin and Terne Plate—Hot dipped	10	33	3,793,850	145,967	45.3	145,147	xxxx	1,689,844	53.5	1,773,848	xxxx
—Electrolytic	10	34	2,251,850	80,877	42.7	65,879	xxxx	740,348	39.8	730,459	xxxx
Sheets—Hot rolled	30	35	19,197,320	1,231,535	75.5	569,056	36,704	11,357,394	71.0	5,648,827	389,955
—Cold rolled	12	36	7,131,460	446,871	73.8	301,333	xxxx	3,860,047	65.0	2,279,180	xxxx
—Galvanized	16	37	2,915,130	142,087	57.4	145,151	xxxx	1,432,321	59.0	1,436,279	xxxx
Strip—Hot rolled	24	38	7,055,390	216,960	36.2	136,822	23,023	2,205,272	37.5	1,362,675	230,031
—Cold rolled	35	39	3,119,850	109,478	41.3	104,247	xxxx	1,136,997	43.8	1,063,071	xxxx
Wheels (car, rolled steel)	5	40	319,400	24,620	90.7	25,154	xxxx	243,135	91.4	244,155	xxxx
Axles	6	41	408,170	12,491	36.0	12,348	xxxx	123,013	36.2	124,974	xxxx
All other	5	42	190,490	3,338	20.6	3,360	xxxx	38,549	24.3	35,387	xxxx
TOTAL STEEL PRODUCTS	152	43	xxxx	xxxx	xxx	4,660,237	393,060	xxxx	xxx	52,740,917	4,794,993
Effective steel finishing capacity	152	44	67,310,000	xxxx	xxx	xxxx	xxxx	xxxx	xxx	xxxx	xxxx
Percent of shipments to effective finishing capacity	152	45	xxxx	xxxx	xxx	74.6%	xxxx	xxxx	xxx	85.5%	xxxx

During 1944 the companies included above represented 99.0% of the total output of finished rolled steel products as reported to American Iron and Steel Institute.

RFC Puts Geneva Steel Plant On Block with Sealed Bids Due Mar. 1

Washington

• • • **RFC has put the $195 million Geneva steel plant on the block. It announced on Dec. 14 that sealed bids or proposals either to lease or sell will be received at the RFC's office in Washington on March 1, 1946. With the plant, soon to be declared surplus to Government needs, will be offered coal mines at Columbia, iron ore mine facilities at Cedar City and quarry facilities at Payson, all in Utah.**

Disposal of the property will be in accordance with provisions of the Surplus Property Act laid down in the report to Congress on Oct. 8. Under this policy, which contemplates disposal to a buyer capable of independent operation, real value as distinct from reproduction costs will be dependent primarily upon ability to produce income over and above amortization, interest and depreciation as well as over operating costs. SPA recognized that for the Government to attempt to get more than a price measured by earning power, regardless of what the facilities cost, will hamper sales and lessen financial returns to the Government.

While RFC did not fix a floor, in asking for bids, as it was reported it might do, it did call for reasonable offers.

It was pointed out in the pricing policy that price must, of course, reflect the additional expenditures necessary to complete, expand or add facilities which are required to round out the proposed peacetime production program. Recognition also is given by the Government that determination of prospective earnings of some plants, especially those in new steel producing areas, involves estimation of uncertainties and can involve assumption of excessive risk by purchasers, that must be considered in pricing. It was added that the reproductive value of the Geneva plant, including the coal and ore mines and quarry and their equipment, together with reasonable allowance for reserve and excess facilities less accrued depreciation may also be treated as a factor in arriving at the purchase price of the plant.

Bids for purchase may be predicated upon all cash or credit terms and such terms may include a reasonable down payment, waiver of interest up to two years, and amortization to begin the third year with final maturity not more than 18 years from date of purchase. Proposals for leasing, if requiring additional expenditures by the Government, must provide for firm minimum rentals which will amortize such expenditures, with interest, over a reasonable period less than the term of lease. Proposals for lease may include options to purchase upon reasonable terms at any time prior to two years preceding the effective date of termination of the lease.

There are three types of bids, A, B, and C. "A" covers proposal to purchase "as is" with cash payment.

"B" proposes to purchase "as is" with term payment, down payment to be a reasonable amount or percentage of the purchase price. In determining the acceptability of the down payment, RFC will give due consideration to changes or additions and the proposed method of financing them. Quarterly amortization and interest payments will be required, except that consideration will be given to waiving such payments for the first two years. Final payment of balance of purchase price to be made within 18 years of the date of the sale. Interest will be at the rate of 4 pct, except that interest may be waived for the first two years in evaluating cash bids as compared with term bids, waived interest on term bids will be computed at 2 pct.

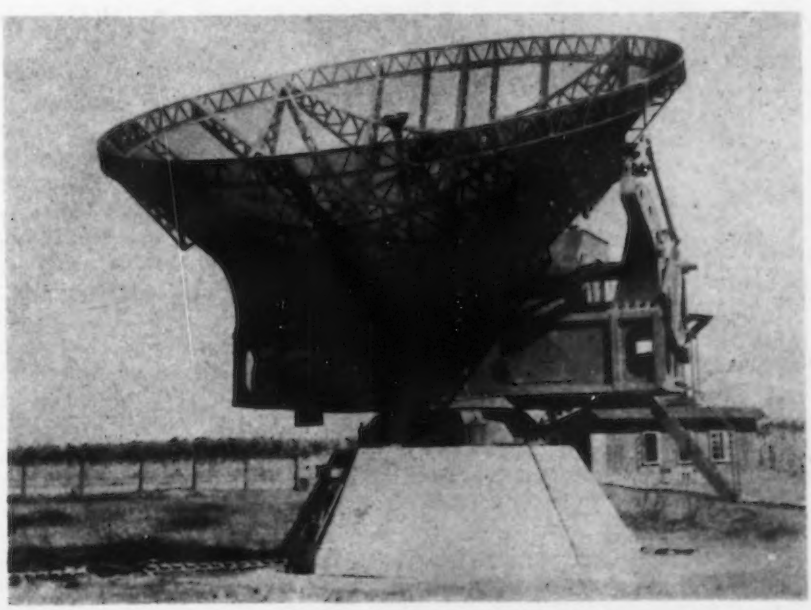
"C" bids cover bids or proposals for lease of the plant "as is" or upon terms requiring reasonable additions or changes to be made at Government expense. Lease proposals of the latter type must provide for firm minimum rentals which will amortize the additional Government expense required, with interest, over a reasonable period less than the term of the lease.

RFC also is asking the bidders what they will do about employment, including the number of men they estimate they will employ and the length of employment; the bidder's financial responsibility, their steel production and sales experience, and ability to provide executive, operating and sales personnel.

Also they must certify what effort they will make to secure the maximum share of available business; give a projected schedule of production for each major product for each of the next five years; state their pricing policy, including plans, if any, for the establishtment of a basing point on major products.

Estimate gross earnings for each of the five years (optional); give contemplated plans for developing additional consuming markets; plan for preserving original facilities for future emergencies; list existing facilities together with new facilities required for these operations, with cost; state other changes needed in existing facilities, with cost; give plan for financing cost of additional facilities together with their proposed location, either at plant or elsewhere; and list existing facilities not needed.

GERMAN RADAR: *A German "giant Wurzburg" installation, used for ground control of fighters and directional control of anti-aircraft fire during the war.*



Full Employment Bill, House Version, Sheds "Jobs for All" Theme

Washington

• • • Striking the boon-doggle label from the Senate-approved "Full Employment" bill, the House Expenditures Committee on Dec. 4 voted out its own version with a declaration in favor of a Federal policy maintaining "a high level of employment in the nation." House action is expected within a week and final enactment will probably come next year.

Action followed weeks of stalemate and several close encounters with moves to shelve the legislation altogether. President Truman had repeatedly called for action and in his recent address on wages and prices accused the Committee of "damaging delays."

The chief objection to the Senate version is that the long-range economic forecasts required would not be feasible and would probably invite severe economic dislocations if used for the basis of the "job budget" called for in the bill. A heavy argument advanced by its critics was the fact that the actual margin of error in estimating the Federal budget over the past 20 yr was around 20 pct.

Painstakingly avoiding any government assurance of "jobs for all," the House bill proposes to maintain high levels of production, employment and purchasing power. Also eliminated was the provision that the President shall submit a yearly job budget which would be the basis for Congressional authorization of public works projects.

The mechanics of the House version provide for:

(1) Creation of a three-member Council of Economic Advisers made up of "exceptionally qualified men" who will receive $15,000 annually. The board would be charged with the job of analyzing economic developments and trends and assist the President in preparation of an annual report on the domestic outlook.

(2) Submission by the President of an economic report to Congress within 60 days after the start of each regular session, surveying job and production prospects and inflationary conditions, if any, together with recommendations for economic improvement.

(3) Establishment of a special, joint House-Senate committee which would make a study of the report and pass on the merits of the recommendations. The Committee would, in turn, report to each House its recommendations on the President's economic proposals.

CPA Estimates 1/3 Of Warplants May Be Used For Civil Production

Washington

• • • The iron and steel industry is estimated to have a potential of 86,000 workers from new plants and facilities which cost the government $1,202,000,000; nonferrous metals, 75,000 persons with a $1,018,000,000 manufacturing expansion cost; chemicals and petroleum products, 30,000, expansion cost $686 million; synthetic rubber, 23,000, expansion cost $667 million; aviation gasoline, 7,000, expansion cost $237 million and other manufacturing plants, 66,000 workers from a federal expenditure on plants of $169 million. These estimates were made in a 42-page report issued on Dec. 6 by CPA on "War-created, Federally Financed Manufacturing Plants," covering the 1940-44 period.

It is estimated in this report, that at least one-third of the government's $14 billion expenditures for manufacturing facilities might possibly be made available for production of goods for the civilian economy.

Employment possibilities were listed at 177,000 additional workers for the machinery and equipment industry on which the government spent $533 million for manufacturing plants.

These employment potentials are based on the assumption that these industries would have minimum difficulties in switching from war to maximum peacetime production. The large variation in the expected new number of workers which could be employed per dollar value of plant, reflects the production processes of the industries.

"However, this 'usable remainder' of about $4.6 billion of plant expansion is but one of the factors involved in the problem of federally financed plants," the report said. "Only by a well considered policy on the part of government, industry and labor, will the nation avoid a serious 'economic hangover' resulting from this rapid plant expansion."

In addition to the $14 billion worth of government-owned warplants, there are approximately $4 billion of privately financed manufacturing plant expansions. These will be discussed in a later report according to the CPA's Industrial Statistics Div.

The report just issued said that while the postwar future of the wartime manufacturing plant expansion is not overly bright, the use of engineering ingenuity and a presently indeterminable demand may change the picture.

It was emphasized, however, that the expansion in manufacturing plants did not take place alone. It was accompanied by a $27.2 billion expansion in non-manufacturing facilities. These facilities included expenditures of $8.2 billion for housing of which $6.1 billion was privately financed and $2.1 billion by the government. Highways and streets financed by states and municipalities took $2.6 billion.

Bryant to Build New Plant

Cleveland

• • • Bryant Heater Co., one of the operating companies of Dresser Industries, Inc., is building a new plant in Tyler, Tex., where it will manufacture water heaters, floor and sidewall furnaces and unit heaters.

Another Dresser Industries member company, Day & Night Mfg. Co., Monrovia, Calif., makes water heaters and ships from California to Texas and the South, but the new plant is being built with a view to better serving southern markets. The plant, covering 110,000 sq ft of floor space, will be completed early in the new year and will employ 150 to 250 men.

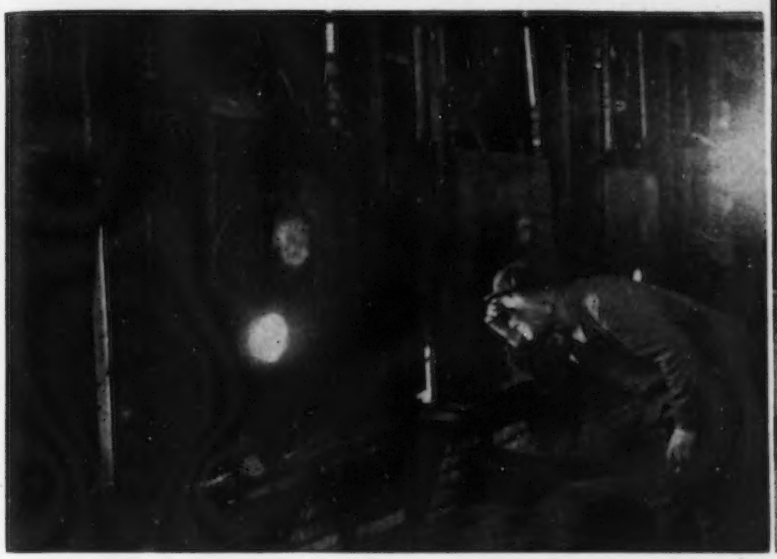
Says Reconversion "Good"

London

• • • Reconversion progress in Britain was described as "good" by Sir Stafford Cripps, president of the Board of Trade, in a speech to Parliament recently. He stated that the changeover had been expected to take nine months, but that in much less time great progress had been made.

Bottlenecks in labor and in the supply of materials were referred to, especially the serious difficulty in obtaining castings. This problem was said to be the outgrowth of troubles in the recruitment of labor for the foundries. Individual statements were made on various industries including motor vehicles, printing machinery, textile machinery, radios, and other items.

Industrial Rehabilitation Seen Well Along in Postwar Russia



• • • **Restoration of Russian** industry is illustrated by the accompanying pictures taken in various manufacturing plants throughout the Soviet Union.

During the period of their rule in Yeisk on the Azov Sea, the German invaders destroyed the Molot factory, which manufactured parts for agricultural machinery. The factory was rehabilitated after the expulsion of the Germans. In the photo, upper right, the wife of a serviceman has taken her husband's place in the plant, and is shown drilling holes in gears for harvester combines.

The photo, upper left, illustrated the making of steel in the openhearth furnace dept. of the Uzbek Iron and Steel Works. This industrial enterprise was completed during the war and is the first ferrous metallurgical plant to be built in the Uzbek Republic, the main supplier of cotton in the U. S. S. R.

The photo, right center, shows a youth production crew assembling motors in a motor assembly plant. Another view of the motor assembly plant, lower right, is a group of fitters, once again manufacturing peacetime products.

Government Leases RFC Alumina Plant To Reynolds Metal

Washington

• • • Marking the first successful step of RFC and SPA in their protracted effort to turn the idle plants over to private enterprise, RFC has leased the Government-owned Hurricane Creek, Ark., alumina plant and the Jones Mill, Ark., aluminum reduction plants to the Reynolds Metals Co. The lease is subject to the approval of SPA and the Dept. of Justice with the proviso that the royalties required by the Aluminum Co. of America on certain facilities are satisfactory to RFC.

Hurricane Creek is the largest alumina plant in the world with an annual capacity of 1.555 billion lb. Jones Mill, 20 miles away, has an annual rated capacity of 144 million lb of aluminum pig. However, it has a power plant only capable of producing half enough electricity required for full operation. Consequently, said President R. S. Reynolds, who announced leasing of the plants, the Reynolds Co. plans an annual production of 72 million lb of aluminum ingot at this plant. Reynolds also has manifested interest in acquiring other aluminum plants, among them the plants at Troutdale, Ore., and Spokane, Wash.

Reynolds, under the terms of its approved offer, will lease the two Arkansas plants for 5 yr on a rental basis with a minimum payment to the government during the period in excess of $6,000,000, and a maximum payment for the same period of approximately $12,000,000 with an option to purchase at the expiration of this lease period. In addition, Reynolds will pay all real estate taxes and insurance costs, furnish the needed working capital and assume all losses, if any, from the operations. The lessee has agreed to sell alumina produced at Hurricane Creek, above its own needs, to others at cost plus 6 pct. No government subsidy of any kind is involved.

Acquisition of the Hurricane Creek alumina plant coupled with Reynolds existing production at Listerhill, Ala., Mr. Reynolds said, assures industry of a sure source of alumina sufficient to meet the needs of an expanding industry for the next few years. The addition of Jones Mill's 72 million lb annual capacity to its own reduction plants at Listerhill, and Longview, Wash., which have a 165 million lb annual capacity, gives this independent company a total annual capacity three-fourths that of the entire American prewar production.

CPA Modifies Inventory Curbs on Struck Plants

Washington

• • • Manifesting concern over the prospect of excessive stocks of critical materials being piled up at strike-bound plants, CPA has modified its general inventory controls which would require that 30 days after work stoppage the materials be diverted to other users. At the same time CPA said, this move would prevent disruption of suppliers schedules and consequent loss of output.

While CPA mentioned no specific plants or materials, its action was interpreted to have a direct bearing on the shipments of such products as steel to automobile and other plants that are closed by strikes. The plan, however, has a possible catch in it in view of the threatened USW strike in steel, aluminum and numerous other industries.

CPA's recognition of the strike situation and its possible effect on inventories was reflected by the issuance of Direction 6 to PR 32, the general inventory control. Left unchanged, it was pointed out, inventory restrictions in cases of work stoppages might require immediate deferment or cancellation of all material orders, regardless of the length of the stoppage, thereby requiring rearrangement of suppliers schedules and adversely affecting the production and distribution of critical materials. Also, said CPA, it might delay resumption of full scale operations at the termination of the work stoppage.

Direction 6 allows 30 days following work stoppage for a plant to build up reserves ready to be used when operations are resumed. The reserves apply only to orders already on order.

The direction does not apply to any part of a customer's operations which are not suspended or which have resumed. In these cases materials may be produced and delivered by the supplier and received by the customer to the extent permitted by PR-32.

Washington Comment

(CONTINUED FROM PAGE 80)

A reduction of even 5¢ per lb will not make too much difference unless the cost of the semifabricated form is brought down even more.

FROM the standpoint of comparative prices of other materials, the relatively high price of magnesium is a decided drawback. This price differential is more out of line in the fabricated form than in ingot form. The report cites the example that a 25 pct reduction in ingot costs reduces sheet costs only 7 pct and the cost of castings even less.

With regard to the opportunities of small business in the magnesium industry, it is pointed out that the size of the plants and the need for strong research and technical staffs would make operation of magnesium metal plants difficult. However, in the field of fabrication, small business has a real opportunity, the report declares.

Recognizing that the impact of a large surplus stock of magnesium would threaten the operator of any postwar plant, the SPA report makes the following recommendations with respect to existing stockpiles:

1. The present government stockpile should be frozen and quantities which become available through termination inventories and salvage should be added to the stockpile.

2. If it appears that quantities of magnesium are being sold to speculators at extremely low prices, regulations establishing a floor price and restricting sales quantities should be issued.

3. Secondary smelters should be permitted to continue production by utilizing some scrap withheld from the stockpile.

4. Lower-grade magnesium scrap should be reduced to more suitable forms for storing purposes by toll smelting.

If the decision is reached to establish a national security stockpile in excess of quantities now available to the government, the report points out that it would greatly improve the prospects of the plants retained for partial operation by providing a market during the period required for development of commercial uses. Such a program would require specific Congressional authorization granting funds for stockpile purchases.

The report favors outright sale

as the best means of disposal but admits that uncertainties of the market is likely in many cases to make outright sales impossible. No firm offers for any of the plants have been received to date. Leases which will put the plants to work immediately and give employment at the same time, it is said, may very well lead to better sales terms.

Until disposition of the Dow-Texas plants is settled, the report states, it will be difficult to negotiate firmly for the other plants. The report gives three alternatives for disposal of the Freeport plant which, it is said, cannot be operated by any other company:

1. Sale or lease to Dow with unrestricted right to engage in magnesium production.

2. Sale or lease to Dow with right to produce items other than magnesium with provision for limited production of magnesium. This method is preferred by SPA.

3. Maintenance in standby condition.

The Velasco plant in which Dow, Permanente and Basic Refractories have shown interest may be disposed of, according to the report, (1) on a standby basis, (2) production on an unlimited basis which would stifle competition due to its favorable production cost position, (3) for production of items other than magnesium, (4) for production of both magnesium and other items.

Under contract provisions, Dow is given the right of first refusal which, if not waived, would require approval of the Attorney General in view of the possible monopoly situation.

Four additional plants, the Diamond Magnesium Co., Painesville, Ohio; Magnesium Reduction Co., Luckey, Ohio; Electrometallurgical Co., Spokane, Wash.; and the New England Lime Co., Canaan, Conn., will be retained for magnesium production and will be disposed of under the following terms: (1) capacity will be used wholly or partially for production of magnesium and (2) facilities not so used will be retained in standby condition so that production can be resumed within 90 days.

Seven other plants which are not needed on a standby production basis should be disposed of for other purposes. These plants, the report states, are uneconomic producers with either high operating costs or poor locations or are in poor physical condition.

(See map on p. 80)

Industrial Briefs...

• OPENS SALES OFFICES — A. Milne & Co., steel distributors, has announced the opening of a new sales office in Rochester, N. Y., at 703 Temple Bldg., in charge of Courtland W. Schefer, and an office in St. Louis, at 411 N. 7th St., in charge of John I. Kitts.

• FIRE HALTS OUTPUT—Following a fire Dec. 3, which caused an estimated $500,000 damage to the alkalation unit of the government-owned styrene plant which Monsanto Chemical Co. operates at Texas City, Tex., attempts are being made to resume production at the earliest possible moment. The plant is one of the two largest in the country devoted to the manufacture of styrene, an essential material in synthetic rubber.

• MERGER — Operations of Industrial Rubber Process Co. and Plastoweld Co., subsidiaries of J. I. Spanich Welding Co., have been consolidated into the parent company at Detroit. The company produces light and medium stampings and does cycle welding; headquarters are in a recently purchased building 30856 Five Mile, Plymouth, Mich.

• BUYS CONTROL — Controlling interest in Algoma Products Co. Detroit, has been acquired by L. Hoster, president, and a new plant has been purchased at 1557 E 8 Mile Rd., Detroit. George Winnert is sales manager, and Carl Hoffman, purchasing agent.

• PARAGON EXPANDS—The Paragon Electric Co., Two Rivers, Wis., is planning to expand its manufacturing facilities to a level approximately four times its prewar output.

• NEW MOTOR FIRM — The Kiekhaefer Aeromarine Motors, Cedarburg, Wis., is being organized to specialize in engineer and development in the lightweight engine field.

• DELTA EXPANDING — Delta Mfg. Co., Milwaukee, plans immediate erection of a $300,000 addition to its plant at 620 E. Vienna St., to double its present space.

• FOUNDRY CHANGES — Foundries unable to make improvements during the war due to the heavy strain placed upon them for castings are beginning to plan and make additions, buying new equipment to replace obsolete, revamping layouts, etc. A few are the Standard Foundry Co., Worcester, Mass., a $30,000 addition; Crompton & Knowles Loom Works, Worcester, extensive alterations; Gallison Foundry Co., Lawrence, Mass., $30,000 foundry; and Peerless Foundry Co., Bridgeport, Mass., casting plant addition.

• NEW PLANT — Hydro-Power, Inc., has announced the location of a new factory at Springfield, Ohio. Plant design and construction contracts have been awarded to the Austin Co., Cleveland. The factory building, constructed on a 10 acre tract, will be 362 ft long and 90 ft wide.

• AWARDED SERVICE MEDAL — With more than 52 yr uninterrupted association with U. S. Steel Corp. subsidiaries and predecessor companies, Charles J. Curtin, Chicago purchasing department employee of Carnegie-Illinois Steel Corp., has been awarded the Judge Gary Service Medal.

• ACQUISITION — E. L. Cord, former automobile manufacturer, has acquired control of the Chicago Electric Mfg. Co., and the firm will embark on a $100,000 expansion program. Harold T. Ames, representing the Cord interests, will become president of the firm, but active direction will remain with Howard Oetjen, vice-president and general manager.

MACHINE TOOLS

. . . News and Market Activities

Machine Tool Inquiries Remain Heavy

New York

• • • Inquiries for new machines are maintaining a comfortably high level in this area, although this week has seen a slowing down due to the approach of the holiday season. The emphasis appears to be particularly on special machines, despite the fact that deliveries are being quoted at anywhere from 36 to 48 weeks. There is little interest in standard machines, and undoubtedly surplus equipment is having a dampening effect on the market.

The new regulation allowing dealers a 12½ pct commission on the sale of surplus is not arousing much enthusiasm. Most dealers feel that this is too low to allow them a fair margin of profit. They feel that as reputable dealers they assume a moral obligation for the continued performance of any machine they sell, and that therefore they will be called upon to render service for months, or possibly years, without any compensation other than the original commission, which is not adequate to cover these costs.

The 15 pct originally suggested was regarded as the absolute minimum at which they could operate, and the 2½ pct drop will mean that they will probably show a loss on most transactions.

Some would-be buyers are going so far as to ask dealers to inspect RFC machines on their behalf, and on the basis of their reports buying direct from RFC without crediting the dealer with the sale. Dealers, naturally, are not acceding to these requests, but are showing a willingness to furnish a buyer with information as to age and general characteristics.

There had been considerable expectation that returning servicemen would prove good customers for machine tools by setting up small businesses, as was the case after the last war. Thus far, however, these hopes have not been realized. Many of the larger concerns are modernizing their shops, but there has been a noticeable lack of new shops being opened up.

Another unexpected snag in the sales of used equipment is the fact that workers who have been accustomed to cleaning, setting up, and adjusting new machines, are showing a strong dislike for the somewhat messy job of tearing down, overhauling, and reassembling old ones. This may not, in itself, be a serious matter, but it is one more headache to plague the dealer.

Age, Condition Price Formula Established

Washington

• • • Revising the age and condition requirements, OPA has announced a new formula, effective Dec. 22, governing sales of used machine tools. It entails calculation of selling prices on the basis of age so as to provide automatic reductions in ceiling prices for second hand machine tools as they grow older. Under the present formula, prices for used machine tools are established on the date of manufacture and condition of the machine with no provision for reducing prices as the tools become older.

Under the revised age and condition qualifications, ceiling prices will be established for second-hand machine tools as follows:

If the used machine tool is no more than four years old, the maximum price if rebuilt and guaranteed is 95 pct of the price when new; if sold in other condition, such as "as is," 70 pct of the price when new.

If more than four years but less than ten years old, the ceiling price is 85 pct of the price when new if sold in rebuilt and guaranteed condition, and 60 pct of base price if sold in other condition.

If 10 years old but less than 15 years old, the ceiling price is 80 pct of the price when new if sold in rebuilt and guaranteed condition, and 55 pct of base price if sold in other condition.

If 15 years old, but less than 20 years old, 70 pct of base price if sold in rebuilt and guaranteed condition, and 45 pct of base price if sold in other condition.

If 20 years old or older, 60 pct of the base price if sold in rebuilt and guaranteed condition, and 35 pct of base price for other condition.

The revised age and condition qualifications preserve the previously established differential of 25 pct between prices for rebuilt and guaranteed used machine tools and those sold "as is" without rebuilding or guarantee.

RFC Runs Special Sales

Chicago

• • • Special sale of machine tools from three government owned plants in the Chicago-Milwaukee area is being carried on by Reconstruction Finance Corp., and representatives have been placed at the plants.

The tools are located at the Gary armor plate plant of Carnegie-Illinois Steel Corp., Gary, Ind.; the Pressed Steel Car Co. plant, Hegewisch, Ill.; and Building 144 of A. O. Smith Corp., Milwaukee.

Used standard general purpose machine tools are located at the three plants, and heat treating furnaces, generators and plating equipment, jib cranes and arc welders are also offered at the A. O. Smith plant.

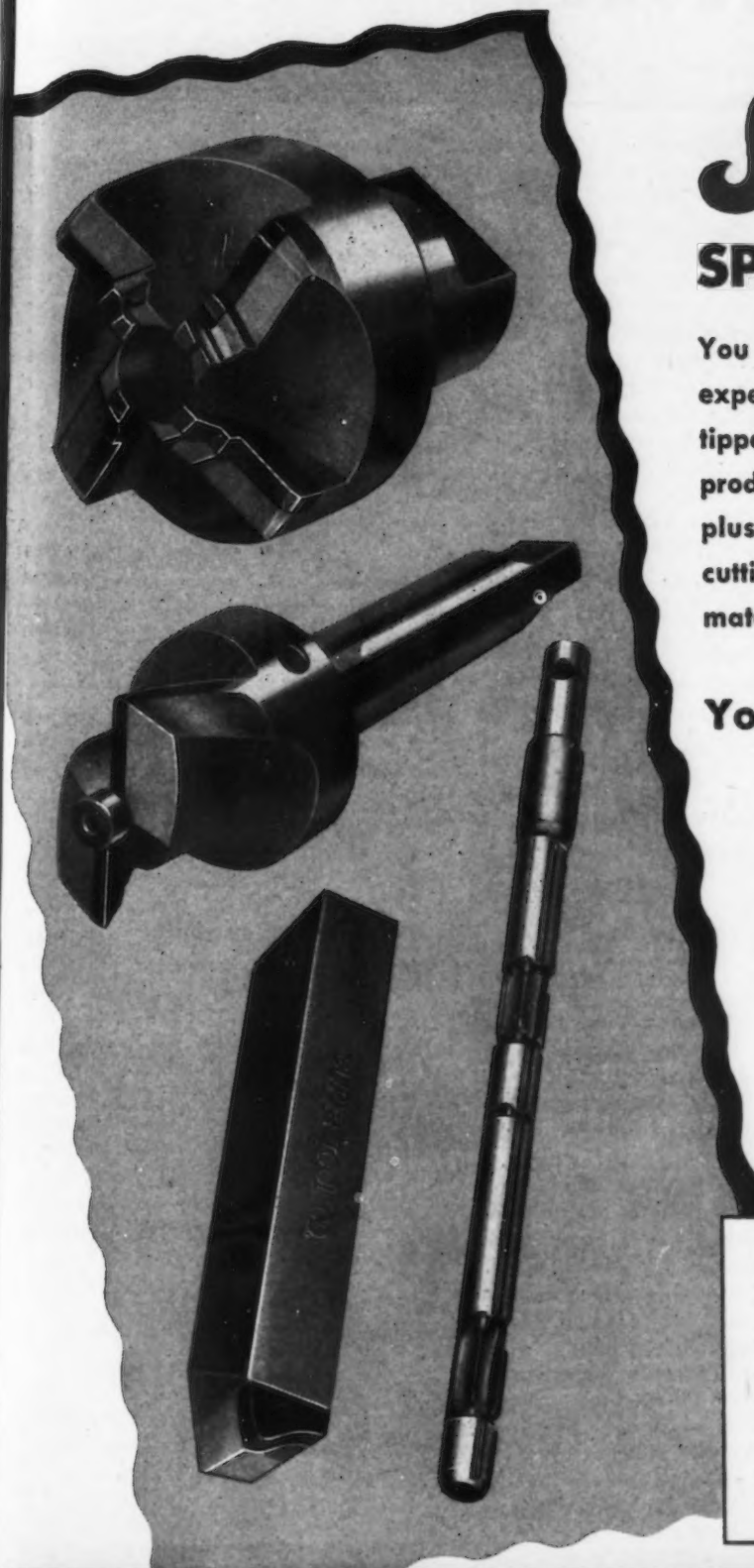
The 1200 miscellaneous machines and machinery items at A. O. Smith include large lathes, milling machines, drill presses and radial drills. At Pressed Steel Car Co. are engine lathes, grinders, turret lathes, vertical drills, boring mills, shapers, milling machines, slotters and straightening and bending rolls.

Strike Causing Shortage

Cincinnati

• • • The steel strike threat added a new uncertainty to the district machine tool market, the past week. With builders already nearing their wits' end to obtain necessary components, manufacture of which has been retarded by labor stoppages, many local manufacturers predict that unless the labor situation in allied industries clears soon, a number of local plants will have to close because of lack of materials. No one, however, appears to anticipate such dire results before the first of next year, but the situation does appear grave.

Here's how to cut costs on today's tough jobs



SPECIFY

SUPER

SPECIAL CARBIDE TIPPED TOOLS

You get the benefits of Super's years of experience in the manufacture of carbide-tipped tools. You get the benefits of the production experience of Super's engineers plus the keen analysis of your problems in cutting cast-iron, steel and non-ferrous materials.

You get Super Satisfaction because

Super tools deliver the EXTRA . . . that brings costs down on every production job. You get speedier production . . . top-notch accuracy . . . and real economy when you specify Super Tools. No matter what your cutting job . . . consult Super first . . . cut costs today.

WHATEVER YOUR CUTTING JOB LOOK FIRST TO SUPER . . .

Super Tool Company makes a complete line of standard carbide-tipped bits, reamers, plain and side mills, shell end mills, face mills, end mills, counterbores, drills, and centers. You'll get real satisfaction when you specify Super Tools.

SUPER TOOL COMPANY

Carbide Tipped Tools

21650 Hoover Road, Detroit 13, Michigan ★ 4105 San Fernando Road, Glendale 4, California

NONFERROUS METALS

. . . News and Market Activities

New British Light Alloy Producer Set

New York

• • • A large new British light alloy venture is being financed in London. A new public company, Almin, Ltd. has been formed "to promote the production of metals of every description, including, in particular, aluminum and magnesium."

The directors include L. F. A. D'Erlanger, chairman of Erlangers Ltd., and P. Horsfall, a managing director of Lazard Bros. The other directors, W. C. Devereux and S. Sanders, represent International Alloys Ltd.

•

Nickel Use High

New York

• • • In discussing the nickel industry during 1945, Robert S. Stanley, president and chairman said that approximately 60 pct of the refined nickel delivered went into the steel industry in the U. S. Of the nickel consumed by the steel industry for wrought steels during the war, over 40 pct went into stainless steels. It is expected that some fields in which the nickel chromium stainless steels are expected to expand are the chemical, transportation and food processing industries. Since September 1939 the company has delivered 1.5 billion lb of nickel.

•

Canadian Copper To Go to United Kingdom

Toronto

• • • Negotiations are pending, and appear to show indications of favorable outcome regarding the sale of Canadian copper in the United Kingdom. According to reports the price will be approximately the same as that now being paid by the United States, but it has not yet been decided as to whether Canadian producers or British buyers will absorb shipment, insurance and other charges. It is stated that Britain now is nearing the point where her copper stocks will have to be replenished. It is further stated that Canadian copper may find a market in some of the continental countries of Europe and the Ottawa government will assist in providing exchange.

Canadian exports of base metals have been holding at a fair level, but well below the wartime peak, but there are indications of improvement for the coming year. For the first nine months of this year exports of lead in pigs amounted to 155,454,800 lb, valued at $5,465,163, and lead in ore to 12,536,000 lb valued at $430,-719. Zinc spelter shipments abroad totaled 176,800,000 lb valued at $9,-113,998, while zinc exported in ore amounted to 146,042,000 lb valued at $4,490,611. Copper shipped out of Canada in ingots, bars, slabs and billets amounted to 146,512,100 lb valued at $17,583,051 while in ore, matte and concentrates copper exported amounted to 29,818,900 lb, valued at $2,087,-323. Nickel exports in all forms including refined metal and metal in oxides, matte, etc., totaled 173,349,800 lb valued at $43,822,927.

•

Lead Position Will Require Restriction

Washington

• • • A further heavy use of the government stockpile of lead plus a reduction of 12 to 15 pct in the permissive uses of the metal will be necessary to combat an indicated 60,000 ton lead deficit during the first quarter of 1946, CPA said recently. At least 25,000 tons will be released from the government stockpile during the first three months of next year. A similar amount was released in the fourth quarter of 1945.

As a further step to narrow the gap between supply and permitted uses, the CPA plans to require consumers to use some tonnages of secondary antimonial lead, now piled up at various smelters, in preference to primary lead, where such material can be adapted to users products.

These proposed plans "to make ends meet" on lead were outlined by government officials to members of the Lead Producers Industry Advisory Committee at their recent meeting here.

Asked by industry members why the government stockpile was not made completely available to meet the lead deficit to eliminate any reduction in allocations, officials of CPA's Tin-Lead-Zinc Div. pointed out that such a procedure would exhaust the stockpile by April.

British Optimistic About Tin Supplies

London

• • • Issue is taken with American tin supply figures for the coming year in which a world shortage is predicted to continue, in the British journal, Sheet Metal Industries. Taking into consideration the current political troubles in the Dutch East Indies, which will delay the resumption of production there, it is still asserted that 1946 needs are apt to be met by available supplies.

En route to Britain are said to be 12,000 tons, and British government representatives are in Malaya buying available tin ore and metal. It is estimated in the magazine that production in six months time will approximate between one-third and one-half the prewar figure, amounting to between 25,000 and 40,000 tons per year. A further 15,000 tons is said to be available in Siam.

The overall picture for the coming year is outlined as follows:

World stocks, 90,000 tons.

Eastern areas production, 60,000 tons.

Total available, 150,000 tons.

Prewar world consumption ran between 120,000 and 180,000 tons, and of this figure Germany and Japan used 16,000 tons. Considering the disorganization of European industry and the difficulties of reconversion in England and America, the magazine draws the conclusion that next year's demand should fall well within available supplies.

•

Copper Deliveries Rise

New York

• • • November deliveries of copper to customers have reached 119,923 short tons, an increase of more than 15,000 tons over last month and nearly 40,000 tons from September. Meanwhile, the production of refined copper holds its own at 70,218 tons which indicates that the balance of delivery requirements must come out of the stockpile or foreign purchases of copper. The production of crude copper in November declined by 4000 tons to 65,236. This figure represents a stage in the decline that has gone on for the past several months, although October showed considerable increase

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, del'd (Min. 10,000 lb)	15.00
Aluminum pig	14.00
Antimony, American, Laredo, Tex.	14.50
Beryllium copper, 3.75-4.25% Be; dollars per lb. contained Be	$17.00
Cadmium, del'd	90.00
Cobalt, 97-99% (per lb)	$1.50 to $1.57
Copper, electro, Conn. valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$ 2.25
Iridium, dollars per troy oz.	$90-$100
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9 + %, carlots	20.50
Magnesium, 12-in. sticks, carlots	27.50
Mercury, dollars per 76-lb flask, f.o.b. New York	$109 to $112
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per oz.	$35.00
Silver, New York, cents per oz.	71.11
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.65

Remelted Metals

(Cents per lb)

Aluminum, No. 12 Fdy. (No. 2)	9.00 to 10.00
Aluminum, deoxidizing No. 2, 3, 4	7.25 to 10.00
Brass ingot	
85-5-5-5 (No. 115)	13.25
88-10-2 (No. 215)	16.75
80-10-10 (No. 305)	16.00
No. 1 Yellow (No. 405)	10.25

Copper, Copper Base Alloys

(Mill base, cents per lb)

	Extruded Shapes	Rods	Sheets
Copper	20.37	....	20.37
Copper, H.R.	....	17.37	....
Copper drawn	....	18.37	....
Low brass, 80%	....	20.40	20.15
High brass	....	....	19.48
Red brass, 85%	....	20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut	....	15.01	....
Commercial bronze, 90%	....	21.32	21.07
Commercial bronze, 95%	....	21.53	21.28
Manganese bronze	24.00	....	28.00
Phos. bronze, A, B, 5%	....	26.50	26.25
Muntz metal	20.12	18.87	22.75
Everdur, Herculoy, Olympic or equal	....	25.50	26.00
Nickel silver, 5%	....	28.75	26.50
Architect bronze	19.12	....	....

Aluminum

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c.

Plate: 0.250 in. and heavier: 2S and 3S, 21.2c.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness: 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base, 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals: ¼ in., 34½c. per lb.; ½ in., 28¼c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 34c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths, 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

NONFERROUS SCRAP METAL QUOTATIONS

†(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums—other prices are current quotations)

Copper, Copper Base Alloys

OPA Group 1†

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	8.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2†

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Contaminated gilded metal solids	8.00
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.00
Automobile radiators	7.25
Zincy bronze borings	7.00
Zincy bronze solids	8.00

OPA Group 3†

Fired rifle shells	8.00
Brass pipe	7.25
Old rolled brass	6.75
Admiralty condenser tubes	7.25
Muntz metal condenser tubes	6.75
Plated brass sheet, pipe reflectors	6.25
Manganese bronze solids	7.00[1]
Manganese bronze solids	6.00[2]
Manganese bronze borings	6.25[1]

OPA Group 4†

Refinery brass	4.50*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Other Copper Alloys

Briquetted Cartridge Brass Turnings	8.625
Cartridge Brass Turnings, Loose	7.875
Loose Yellow Brass Trimmings	7.875

Aluminum*

Plant scrap, segregated

2S solids	8.00
Dural alloys, solids 14, 17, 18, 24S	4.00
25S turnings, dry basis	3.00
Low copper alloys 51, 52, 61, 63S solids	7.25
turnings, dry basis	5.75

Plant scrap, mixed

Solids	4.00
Turnings, dry basis	2.75

Obsolete scrap

Pure cable	8.00
Old sheet and utensils	6.00
Old castings and forgings	5.00
Pistons, free of struts	5.00
Pistons, with struts	3.00
Old alloy sheet	5.00

Magnesium*

Segregated plant scrap

Pure solids and all other solids, exempt	
Borings and turnings	1.50

Mixed, contaminated plant scrap

Grade 1 solids	3.00
Grade 1 borings and turnings	2.00
Grade 2 solids	2.00
Grade 2 borings and turnings	1.00

*Nominal.

Zinc

New zinc clippings, trimmings	6.50
Engravers, lithographers plates	6.50
Old zinc scrap	4.75
Unsweated zinc dross	5.00
Die cast slab	4.50
New die cast scrap	4.45
Radiator grilles, old and new	3.50
Old die cast scrap	3.00

Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead including cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 23¢ per lb.; 90 to 98% Ni, 22¢ per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point in 500 lb. lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer	25½
Electrodeposited	18⅞
Rolled, oval, straight	19½
Curved	20⅝
Brass, 80-20, frt. allowed	
Cast, oval, 15 in. or longer	23⅝
Zinc, cast, 99.99, 15 in. or longer	16¼
Nickel, 99 per cent plus, frt. allowed	
Cast	47
Rolled, depolarized	48
Silver, 999 fine	
Rolled, 100 oz. lots, per oz.	80

Chemicals

(Cents per lb., f.o.b. shipping point)

Copper cyanide, 1-5 bbls.	34.00
Copper sulphate, 99.5, crystals, bbls.	7.75
Nickel salts, single, 425 lb. bbls., frt. allowed	13.50
Silver Cyanide, 100 oz. lots, per oz.	0.6083
Sodium cyanide, 96 per cent, domestic, 100 lb. drums	15.00
Zinc cyanide, 100 lb. drums	33.00
Zinc sulphate, 89 per cent, crystals, bbls., frt. allowed	6.35

SCRAP

. . . News and Market Activities

Ole Man Winter Stymies Scrap Output

New York

• • • **The recent countrywide** cold wave and snow have adversely affected scrap movement throughout the nation. With demand continuing very strong, the resulting drop in production due to weather conditions will make itself felt in increasing backlogs of unfilled orders.

St. Louis, Birmingham and Chicago report price increases during the past week in those few grades which had not yet reached ceiling. In contrast to this, San Francisco prices have dropped in five of the eight grades, ranging from 50¢ to $1.00 per ton.

Canadian consumers look ahead to greater use of pig iron due to the low scrap inventories and the poor prospects of improving these supplies during the winter months.

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Pittsburgh

• • • **Bidding practices** by scrap dealers on Government owned surpluses of scrap caused excitement this past week and resulted in new stipulations on bidding terms to be issued by disposal agencies. Last week Luria Bros. bid on 10,000 tons of landing mat scrap at Norfolk, placing bids of $14.61 a ton on 2000 tons and $13.55 a ton, the ceiling, on the balance, 8000 tons. Luria placed a stipulation that it wanted all of this scrap or none, and got the award.

On this basis, Luria lost about $2,000 on the 2000 tons purchased at at $14.61, but profited $4,000 on the 8000-ton lot sold at ceiling, just on the basis of the commission. Other bidders, going after portions of the total lot at ceiling or slightly above, were frozen out, since Luria's average bid was $13.76, better than any other dealer.

The upshot of the entire deal was protests from dealers in the eastern area, which finally reached high Government quarters. Since then, an amendment was issued on a request for bids from Frederick, Md., due on Dec. 21, and an amendment was attached to a request for bids on another lot of landing mats from Norfolk. The amendments read: "No bids on an all or none basis accepted."

PITTSBURGH—Scrap demand here continues strong, with supply limited mainly to Government-owned surplus disposals, railroads, and one or two other such sources. Production scrap is nonexistent which, in effect, means that blast furnace grades are in extremely heavy demand and short supply. While demand is strong, there are no reported instances of steel or iron making facilities being shut down for lack of scrap. One large buyer reported this week that west coast scrap is moving into the company's plants in the Chicago area in substantial quantities under the new freight setup.

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CHICAGO—Slowing of shipments due to zero weather places local mills in a critical position for scrap supplies and may even react in a drop in the current high district operating rate. Efforts to build inventories from low levels has been largely unsuccessful, and operators are dependent on current shipments to maintain their operating positions. Brokers are reluctant to take large orders although mills are willing to buy as much of almost any type of openhearth or electric furnace material they can get. Movement of 10,000 tons of shipyard scrap from the West Coast at a freight rate of $14.78 per gross ton is a fair barometer of the desperate situation.

Pittsburgh

• • • Joseph E. Jacobson, Pittsburgh district manager and vice-president, Luria Bros. & Co., Inc., died here Dec. 18 following an operation. Mr. Jacobson was well known throughout the scrap industry and in steel circles and was a former president of the Institute of Scrap Iron and Steel.

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PHILADELPHIA—Mills are urging large scrap shipments into their plants. Snow and cold weather have sharply curtailed yard activities and shipments have been forced to dip sharply. Tightness is evident in all grades. Cast iron inventories in most foundries here are down to an irreducible minimum.

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DETROIT—Demand continues heavy for all grades. Supply, meanwhile, continues in low ground, with some slackening noted correctly because of the cold wave and snow of the past several days. Some mills, evidently desirous of maintaining inventories and obtaining good quality scrap for certain production items, are making purchases on a higher springboard basis than heretofore, with longer freight hauls involved.

BOSTON—Shrinkage in scrap production, uncertain labor supply, difficulty in obtaining freight cars and weather continue to hamper business. Approximately 75 pct of yards report "nothing doing." There has been some cast moved to foundries in truck lots, but aggregate tonnage is unimportant.

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NEW YORK—Arrival of winter snow and cold weather has caused a sharp drop in the movement of scrap in this area. This will, with demand still very strong, further increase the backlog of unfilled orders on hand. Prices continue firm at ceiling. The Salvage Collection Center, Brooklyn, is offering 2700 tons of landing mat steel scrap for sale this week.

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CLEVELAND—A serious scrap situation is developing here and there is talk in some quarters of taking out some openhearths. Shipments of available scrap have been temporarily paralyzed by the frigid weather, and labor in the scrap yards is practically at a standstill. Scrap production is still bogged down, and with demand showing no letup, despite the pending steel strike, all grades continue to bring ceiling prices. From here it looks like a tough winter for the scrap trade.

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CINCINNATI—The demand for scrap material in this area continues to exceed the present supply. Brokers and dealers are spreading out available supply, and so far, no consumer has really suffered, but how long this may be maintained is anybody's guess. Production scrap, of course, if virtually nil, while the surplus government scrap is reported to be not fully acceptable because of the high amount of chromium alloy in it.

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BIRMINGHAM—Consumers of pig iron are endeavoring to obtain deliveries before the steel strike deadline and these efforts have added to already heavy demand for blast furnace material. As far as the market here in general is concerned, no long range commitments are being made, however. Prices remain firm but shipments from yards are being retarded by both inclement weather and labor shortages.

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TORONTO—Demand for scrap continues well in excess of supply here and prices are being maintained at ceiling levels on all materials. Dealers report further slowing down in receipts and while they state that this condition is seasonable, the chief reason is the shortage of scrap in all parts of the country.

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ST. LOUIS—Cold weather, with snow in the St. Louis area tightened further the already short supply of scrap iron, and mills are now willing to bring in material from Texas and Louisiana points with higher freight rates. Shortage of labor to gather and process the material is still a factor. Machine turnings and borings are up to the ceiling prices because of light supply.

Going prices as obtained in the trade by IRON AGE editors, based on representative tonnages. Where asterisks are used on quotations below, this indicates a ceiling price to which must be added brokerage fee and adjusted freight.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00*
RR. hvy. melting	21.00*
No. 2 hvy. melting	20.00*
RR. scrap rails	21.50*
Rails 3 ft. and under	23.50*
No. 1 comp'd sheets	20.00*
Hand bdld. new shts.	20.00*
Hvy. axle turn.	19.50*
Hvy. steel forge turn.	19.50*
Mach. shop turn.	15.00*
Short shov. turn.	17.00*
Mixed bor. and turn.	15.00*
Cast iron borings	16.00*
Hvy. break cast.	16.50*
No. 1 cupola	20.00*
RR. knuck. and coup.	24.50*
RR. coil springs	24.50*
Rail leaf springs	24.50*
Rolled steel wheels	24.50*
Low phos. bil. crops	25.00*
Low phos.	22.50*
RR. malleable	22.00*

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.75*
No. 2 hvy. melting	18.75*
No. 1 bundles	18.75*
No. 2 dealers' bndls.	18.75*
Bundled mach. shop turn.	18.75*
Galv. bundles	16.75*
Mach. shop turn.	13.75*
Short shovels, turn.	15.75*
Cast iron borings	14.75*
Mix. borings & turn.	13.75*
Low phos. hvy. forge	23.75*
Low phos. plates	21.25*
No. 1 RR. hvy. melt.	19.75*
Reroll rails	22.25*
Miscellaneous rails	20.25*
Rails 3 ft. and under	22.25*
Locomotive tires, cut	$23.75 to 24.25
Cut bolsters & side frames	21.75 to 22.25
Angles & splice bars	22.25*
Standard stl. car axles	24.25 to 24.75
No. 3 steel wheels	23.25*
Couplers & knuckles	23.25*
Agricul. malleable	22.00*
RR. malleable	22.00*
No. 1 mach. cast.	20.00*
No. 1 agricul. cast.	20.00*
Hvy. breakable cast.	16.50*
RR. grate bars	15.25*
Cast iron brake shoes	15.25*
Stove plate	19.00*
Clean auto cast.	20.00*
Cast iron carwheels	20.00*

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50*
No. 2 hvy. melting	19.50*
No. 1 bundles	19.50*
No. 2 bundles	19.50*
Mach. shop turn.	$10.50 to 11.00
Shoveling turn.	12.50 to 13.00
Cast iron borings	11.50 to 12.00
Mixed bor. & turn.	11.50 to 12.00
Low phos. plate	22.00*
No. 1 cupola cast.	20.00*
Hvy. breakable cast.	16.50*
Stove plate	19.00*
Scrap rails	21.00*

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars

No. 1 hvy. melting	$15.05*
No. 2 hvy. melting	15.05*
No. 1 and 2 bundles	15.05*
Busheling	15.05*
Turnings, shovelings	12.05*
Machine shop turn.	10.05*
Mixed bor. & turn.	10.05*
Cl'n cast, chem. bor.	$13.06 to 14.15*

Truck delivery to foundry

Machinery cast.	21.00 to 23.51*
Breakable cast	21.57 to 21.87*
Stove plate	20.00 to 23.51*

DETROIT

Per gross ton, brokers' buying prices:

No. 1 hvy. melting	$17.32*
No. 2 hvy. melting	17.32*
No. 1 bundles	17.32*
New busheling	17.32*
Flashings	17.32*
Mach. shop turn.	12.32*
Short shov. turn.	14.32*
Cast iron borings	13.32*
Mixed bor. & turn.	12.32*
Low phos. plate	19.32*
No. 1 cupola cast.	20.00*
Charging box cast.	19.00*
Hvy. breakable cast.	16.50*
Stove plate	19.00*
Automotive cast	20.00*

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.75*
No. 2 hvy. melting	18.75*
No. 2 bundles	18.75*
Mach. shop turn.	13.75*
Shoveling turn.	15.75*
Cast iron borings	$13.50 to 14.00
Mixed bor. & turn.	13.75*
No. 1 cupola cast	20.00*
Hvy. breakable cast	16.50*
Cast, charging box	19.00*
Hvy. axle forge turn.	18.25*
Low phos. plate	21.25*
Low phos. punchings	21.25*
Billet crops	21.25*
RR. steel wheels	23.25*
RR. coil springs	23.25*
RR. malleable	22.00*

ST. LOUIS

Per gross ton delivered to consumer:

Heavy melting	$17.50*
Bundled sheets	17.50*
Mach. shop turn.	12.50*
Locomotive tires, uncut.	$18.50 to 19.00
Misc. std. sec. rails	19.00*
Rerolling rails	21.00*
Steel angle bars	21.00*
Rails 3 ft. and under	21.50*
RR. springs	22.00*
Steel car axles	24.50*
Stove plate	19.00*
Grate bars	15.25*
Brake shoes	15.25*
RR. malleable	22.00*
Cast iron carwheels	20.00*
No. 1 mach'ery cast	20.00*
Breakable cast	16.50*

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$17.00*
No. 2 hvy. melting	17.00*
No. 2 bundles	17.00*
No. 1 busheling	17.00*
Long turnings	12.00*
Shoveling turnings	14.00*
Cast iron borings	13.00*
Bar crops and plate	$18.50 to 19.50*
Structural and plate	18.50 to 19.50*
No. 1 cast	20.00*
Stove plate	19.00*
Steel axles	18.50*
Scrap rails	18.50
Rerolling rails	20.50*
Angles & splice bars	20.50 to 21.00
Rails 3 ft. & under	21.00*
Cast iron carwheels	17.50 to 18.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00*
No. 2 hvy. melting	20.00*
Low phos. plate	22.50*
No. 1 busheling	20.00*
Hydraulic bundles	20.00*
Mach. shop turn.	15.00*
Short shovel. turn.	17.00*
Cast iron borings	16.00*

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$15.33*
No. 2 hvy. melting	15.33*
Comp. black bundles	15.33*
Comp. galv. bundles	13.33*
Mach. shop turn.	10.33*
Mixed bor. & turn.	10.33*
Shoveling turn.	12.33*
No. 1 cupola cast	20.00*
Hvy. breakable cast	16.50*
Charging box cast	19.00*
Store plate	19.00*
Clean auto cast	20.00*
Unstrip. motor blks.	17.50*
Cl'n chem. cast bor.	14.33*

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.25*
No. 1 bundles	19.25*
No. 2 bundles	19.25*
No. 2 hvy. melting	19.25*
Mach. shop turn.	14.25*
Shoveling turn.	16.25*
Cast iron borings	14.25*
Cast iron borings	15.25*
Mixed bor. & turn.	14.25*
Stove plate	19.00*
Low phos. plate	21.75*
Scrap rails	20.75*
Rails 3 ft. & under	22.75*
RR. steel wheels	23.75*
Cast iron car wheels	20.00*
RR. coil & leaf spgs.	23.75*
RR. knuckles & coup.	23.75*
RR. malleable	22.00*
No. 1 busheling	19.25*

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50*
No. 2 hvy. melting	19.50*
Compressed sheet stl.	19.50*
Drop forge flashings	19.00
No. 2 bundles	19.50*
Mach. shop turn.	14.50*
Short shovel.	16.50*
No. 1 busheling	19.50*
Steel axle turn.	19.00*
Low phos. billet and bloom crops	24.50*
Cast iron borings	15.50*
Mixed bor. & turn.	14.50*
No. 2 busheling	17.00*
No. 1 machine cast	20.00*
Railroad cast	20.00*
Railroad grate bars	15.25*
Stove plate	19.00*
RR. hvy. melting	20.50*
Rails 3 ft. & under	23.00*
Rails 18 in. & under	24.25*
Rails for rerolling	23.00*
Railroad malleable	22.00*
Elec. furnace punch	22.00*

SAN FRANCISCO

Per gross ton delivered to consumer:

RR. hvy. melting	$15.00 to 15.75
No. 1 hvy. melting	15.00 to 15.75
No. 2 hvy. melting	14.00 to 14.75
No. 2 bales	12.50 to 13.25
No. 3 bales	8.50 to 9.25
Mach. shop turn.	7.00
Elec. furn. 1 ft. und.	15.50 to 17.00
No. 1 cupola cast.	19.00 to 21.00

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	$12.00 to $13.00
No. 2 hvy. melting	11.00 to 12.00
No. 2 bales	10.00 to 11.00
No. 3 bales	9.00 to 10.00
Mach. shop turn.	4.50
No. 1 cupola cast.	19.00 to 21.00

SEATTLE

Per gross ton delivered to consumer:

RR. hvy. melting	$10.00
No. 1 & No. 2 hvy. melting	10.00
Elec. furn. 1 ft. und.	$14.00 to 15.00
No. 1 cupola cast.	20.00*

HAMILTON, ONT.

Per gross ton delivered to consumer:

Heavy melting	$17.50*
No. 1 bundles	17.50*
No. 2 bundles	17.00*
Mixed steel scrap	15.50*
Rails, remelting	18.50*
Rails, rerolling	21.50*
Bushelings	13.00*
Mixed borings & turnings	12.50*
Electric furnace bundles	20.50*
Manganese steel scrap	20.00*
No. 1 cast	19.00*
Stove plate	17.50*
Car wheels, cast	19.50*
Malleable iron	16.00*

Comparison of Prices . .

[Advances over past week in Heavy Type; declines in *Italics*. Prices are f.o.b. major basing points. The various basing points for finished and semifinished steel are listed in the detailed price tables.]

	Dec. 18, 1945	Dec. 11, 1945	Nov. 13, 1945	Dec. 19, 1944
Flat-Rolled Steel: (cents per pound)				
Hot-rolled sheets	2.20	2.20	2.20	2.10
Cold-rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.70	3.70	3.70	3.50
Hot-rolled strip	2.10	2.10	2.10	2.10
Cold-rolled strip	2.80	2.80	2.80	2.80
Plates	2.25	2.25	2.25	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c-r strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terneplate: (dollars per base box)				
Tinplate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tinplate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (cents per pound)				
Merchant bars	2.25	2.25	2.25	2.15
Cold-finished bars	2.75	2.75	2.75	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (cents per pound)				
Bright wire	2.75	2.75	2.75	2.60
Wire nails	2.90	2.90	2.90	2.55
Rails: (dollars per gross ton)				
Heavy rails	$43.00	$43.00	$43.00	$40.00
Light rails	45.00	45.00	45.00	40.00
Semifinished Steel: (dollars per gross ton)				
Reroiling billets	$36.00	$36.00	$36.00	$34.00
Sheet bars	36.00	36.00	36.00	34.00
Slabs, rerolling	36.00	36.00	36.00	34.00
Forging billets	42.00	42.00	42.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (cents per pound)				
Wire rods	2.15	2.15	2.15	2.00
Skelp	1.90	1.90	1.90	1.90

	Dec. 18, 1945	Dec. 11, 1945	Nov. 13, 1945	Dec. 19, 1944
Pig Iron: (per gross ton)				
No. 2 foundry, Phila.	$27.59	$27.59	$27.59	$25.84
No. 2, Valley furnace	25.75	25.75	25.75	24.00
No. 2, Southern, Cin'ti	26.19	26.19	26.19	24.44
No. 2, Birmingham	22.13	22.13	22.13	20.38
No. 2 foundry, Chicago†	25.75	25.75	25.75	24.00
Basic, del'd eastern Pa.	27.09	27.09	27.09	25.34
Basic, Valley furnace	25.25	25.25	25.25	23.50
Malleable, Chicago†	25.75	25.75	25.75	24.00
Malleable, Valley	25.75	25.75	25.75	24.00
L. S. charcoal, Chicago	42.34	42.34	42.34	37.34
Ferromanganese‡	135.00	135.00	135.00	135.00

† The switching charge for delivery to foundries in the Chicago district is 60¢ per ton.
‡ For carlots at seaboard.

Scrap: (per gross ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.32	17.32	17.32	17.32
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Chicago	20.00	20.00	20.00	20.00
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$7.50	$7.50	$7.50	$7.00
Foundry coke, prompt	9.00	9.00	9.00	8.25
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00
Tin, Straits, New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, virgin, del'd	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	14.50	14.50	14.50	14.50

Composite Prices . .

[Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942 and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943 issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite prices for the current quarter are an estimate based on finished steel shipments for the previous quarter. These figures will be revised when the actual data of shipments for this quarter are compiled.]

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Dec. 18, 1945	2.44076¢ per lb.	$25.37 per gross ton	$19.17 per gross ton
One week ago	2.44076¢ per lb.	$25.37 per gross ton	$19.17 per gross ton
One month ago	2.44076¢ per lb.	$25.37 per gross ton	$19.17 per gross ton
One year ago	2.21189¢ per lb.	$23.61 per gross ton	$19.17 per gross ton

	FINISHED STEEL HIGH		FINISHED STEEL LOW		PIG IRON HIGH		PIG IRON LOW		SCRAP STEEL HIGH		SCRAP STEEL LOW	
1945	2.44076¢	Oct. 2	2.38444¢	Jan. 2	$25.37	Oct. 23	$23.61	Jan. 2	$19.17		$19.17	
1944	2.30837¢	Sept. 5	2.21189¢	Oct. 5	$23.61		$23.61		19.17		$15.67	Oct. 24
1943	2.25513¢		2.25513¢		23.61		23.61		19.17		$19.17	
1942	2.26190¢		2.26190¢		23.61		23.61		19.17		19.17	
1941	2.43078¢		2.43078¢		$23.61	Mar. 20	$23.45	Jan. 2	$22.00	Jan. 7	$19.17	Apr. 10
1940	2.30467¢	Jan. 2	2.24107¢	Apr. 16	23.45	Dec. 23	22.61	Jan. 2	21.83	Dec. 30	16.04	Apr. 9
1939	2.35367¢	Jan. 3	2.26689¢	May 16	22.61	Sept. 19	20.61	Sept. 12	22.50	Oct. 3	14.08	May 16
1938	2.58414¢	Jan. 4	2.27207¢	Oct. 18	23.25	June 21	19.61	July 6	15.00	Nov. 22	11.00	June 7
1937	2.58414¢	Mar. 9	2.32263¢	Jan. 4	23.25	Mar. 9	20.25	Feb. 16	21.92	Mar. 30	12.67	June 8
1936	2.32263¢	Dec. 28	2.05200¢	Mar. 10	19.74	Nov. 24	18.73	Aug. 11	17.75	Dec. 21	12.67	June 9
1935	2.07642¢	Oct. 1	2.06492¢	Jan. 8	18.84	Nov. 5	17.83	May 14	13.42	Dec. 10	10.33	Apr. 29
1934	2.15867¢	Apr. 24	1.95757¢	Jan. 2	17.90	May 1	16.90	Jan. 27	13.00	Mar. 13	9.50	Sept. 25
1933	1.95578¢	Oct. 3	1.75836¢	May 2	16.90	Dec. 5	13.56	Jan. 3	12.25	Aug. 8	6.75	Jan. 3
1932	1.89196¢	July 5	1.83901¢	Mar. 1	14.81	Jan. 5	13.56	Dec. 6	8.50	Jan. 12	6.43	July 5
1931	1.99626¢	Jan. 13	1.86586¢	Dec. 29	15.90	Jan. 6	14.79	Dec. 15	11.33	Jan. 6	8.50	Dec. 29
1930	2.25488¢	Jan. 7	1.97319¢	Dec. 9	18.21	Jan. 7	15.90	Dec. 16	15.00	Feb. 18	11.25	Dec. 9
1929	2.31773¢	May 28	2.26498¢	Oct. 29	18.71	May 14	18.21	Dec. 17	17.58	Jan. 29	14.08	Dec. 3

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 pct of the United States output. Index recapitulated in Aug. 28, 1941 issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Try this Quiz on YOUR METALLURGIST

Q. WHAT IS SULFITE-TREATED STEEL?

A. It's steel which has been mixed with sodium-sulphite while the steel is in the molten state. This is known as the Sulfite Process. It's an exclusive Wisconsin Steel development.

Q. WHAT DOES THE SULFITE PROCESS DO?

A. It cleanses the steel of abrasive oxide inclusions and it adds a small quantity of sulphur to the steel in a widely dispersed state.

Q. WHAT IS THE EFFECT OF THIS PROCESS?

A. The machinability of the steel is tremendously increased. Tool life is greatly extended—often as much as 200%—and production costs are slashed.

Q. DO SULPHUR ADDITIONS EVER HAVE DISADVANTAGES?

A. Yes, but the Sulfite Process is *not* an ordinary sulphur addition. The Sulfite Process has absolutely *no effect* on the surface condition or the physical properties of the steel. An added advantage is the constant uniformity of Sulfite-Treated Steel.

Q. HOW ABOUT STEEL THAT IS HEAT-TREATED?

A. Tests have proved that Sulfite-Treated Steel can be heat-treated and the results will still be the same—far greater machinability.

Q. CAN SULFITE-TREATED STEEL BE APPLIED TO A WIDE RANGE OF PRODUCTS?

A. It is used for everything from crankshafts and axles to wrench sockets and gears. In every application, production costs were cut and a better finished product obtained.

Q. IS IT POSSIBLE TO SULFITE PROCESS *ANY* STEEL?

A. Any steel can be Sulfite Processed. In every case, beneficial results will be noted. But benefits are most pronounced in steel with 30 carbon or over. It's the latest and most practical way to increase machinability.

Consult the Wisconsin Steel sales and metallurgical staffs about your machining problems. We are confident that Sulfite-Treated Steel can solve them.

WISCONSIN STEEL COMPANY

(Affiliate of International Harvester Company)

180 North Michigan Avenue Chicago 1, Illinois

WISCONSIN SULFITE-TREATED **STEEL**

Iron and Steel Prices . . .

Steel prices shown here are f.o.b. basing points, in cents per pound or dollars per gross ton. Extras apply. Delivered prices do not reflect 3 pct tax on freight. (1) Mill run sheet, 10¢ per 100 lb under base; primes, 25¢ above base. (2) Unassorted commercial coating. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25¢ per 100 lb to fabricators. (8) Also shafting. For quantities of 20,000 lb. to 39,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is not used. (11) Boxed. (12) This base price for annealed, bright finish wires, commercial spring wire. (13) Produced to dimensional tolerances in AISI Manual Sect. 6. (14) Billets only. (15) 9/32 in. to 47/64 in., 0.15c. per lb higher.

Basing Points	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	10 Pacific Ports, Cars	DELIVERED TO Detroit	New York	Philadelphia
INGOTS															
Carbon, rerolling	($31.00 f.o.b. mill)														
Carbon, forging	$36	$36	$36	$36	$36	$36	$36								
Alloy	$45	$45				$45	(Bethlehem, Massillon, Canton, Coatesville—$45)								
BILLETS, BLOOMS, SLABS							(Provo—$47.20, Duluth—$38[14])								
Carbon, rerolling	$36	$36	$36	$36	$36	$36	$36	$36				$48[14]	$38		
Carbon, forging	$42	$42	$42	$42	$42	$42	(Provo—$53.20, Duluth—$44[14]) $42					$54[14]	$44		
Alloy	$54	$54				$54	(Bethlehem, Massillon, Canton—$54)						$56		
SHEET BARS	$36	$36		$36		$36	$36	$36	(Canton—$36)						
PIPE SKELP	1.90¢	1.90¢					1.90¢	1.90¢	(Coatesville—1.90¢)						
WIRE RODS[15]															
No. 5 to 9/32 in.	2.15¢	2.15¢		2.15¢	2.15¢	(Worcester—2.25¢)					2.40¢	2.65¢			
SHEETS															
Hot-rolled	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.30¢	2.20¢		2.75¢	2.30¢	2.44¢	2.37¢
Cold-rolled[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 gage)	3.70¢	3.70¢	3.70¢		3.70¢	3.70¢	3.70¢	3.70¢	3.80¢	3.70¢		4.25¢		3.94¢	3.87¢
Enameling (20 gage)	3.45¢	3.45¢	3.45¢	3.45¢			3.45¢		3.55¢	3.45¢		4.10¢	3.55¢	3.81¢	3.77¢
Long ternes[2]	3.80¢	3.80¢	3.80¢									4.55¢		4.16¢	4.12¢
STRIP															
Hot-rolled[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold-rolled[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester—3.00¢)					2.90¢	3.18¢	
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity cold-rolled	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester—3.35¢)					3.05¢	3.31¢	
TINPLATE															
Standard cokes, base box	$5.00	$5.00	$5.00						$5.10					$5.36	$5.32
Electro, box 0.25 lb	$4.35	$4.35	$4.35												
Electro, box 0.50 lb	$4.50	$4.50	$4.50						$4.60						
Electro, box 0.75 lb	$4.65		$4.65						$4.75						
BLACKPLATE															
29 gage[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢[11]			3.37¢
TERNES, MFG.															
Special coated, base box	$4.30	$4.30	$4.30						$4.40						
BARS															
Carbon steel	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢	2.25	(Duluth—2.35¢, Provo, Utah 2.95¢)			2.60¢	2.90¢	2.35¢	2.59¢	2.57¢
Rail steel[6]	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢					2.60¢	2.90¢			
Reinforcing (billet)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢	2.25¢	2.39¢	
Reinforcing (rail)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	2.55¢	2.25¢		2.47¢
Cold-finished[8]	2.75¢	2.75¢	2.75¢	2.75¢		2.75¢		(Detroit—2.80¢)			(Toledo—2.90¢)			3.09¢	3.07¢
Alloy, hot-rolled	2.70¢	2.70¢				2.70¢	2.70	(Bethlehem, Massillon, Canton—2.70¢)					2.80¢		
Alloy, cold-drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
PLATES								(Coatesville and Claymont—2.25¢, Provo, Utah 2.95¢)							
Carbon steel[13]	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢		2.25¢	2.25¢			2.60¢	2.80¢	2.47¢	2.44¢	2.30¢
Floor plates	3.50¢	3.50¢									3.85¢	4.15¢		3.86¢	3.82¢
Alloy	3.50¢	3.50¢			(Coatesville—3.50¢)						3.95¢	4.15¢		3.70¢	3.59¢
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Bethlehem—2.10¢)				2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R															
0.26 to 0.50 carbon	2.80¢			2.80¢			(Worcester—3.00¢)								
0.51 to 0.75 carbon	4.30¢			4.30¢			(Worcester—4.50¢)								
0.76 to 1.00 carbon	6.15¢			6.15¢			(Worcester—6.35¢)								
1.01 to 1.25 carbon	8.35¢			8.35¢			(Worcester—8.55¢)								
WIRE[9]															
Bright[12]	2.75¢	2.75¢		2.75¢	2.75¢		(Worcester—2.85¢)		(Duluth—2.80¢)			3.25¢			3.07¢
Galvanized	Add proper size extra and galvanizing extra to Bright Wire base														
Spring (high carbon)	3.35¢	3.35¢		3.35¢			(Worcester—3.45¢)					3.85¢			3.67¢
PILING															
Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

CORROSION AND HEAT RESISTANT STEELS

In cents per pound, f.o.b. basing point

BASING POINT	Chromium Nickel		Straight Chromium			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 446
Ingot. P'gh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila	Subject to negotiation			Subject to negotiation		
Blooms, P'gh, Chi, Canton, Phila, Reading, Ft. Wayne, Balt	21.25	20.40	15.725	16.15	19.125	23.375
Slabs, P'gh, Chi, Canton, Balt, Phila, Reading	21.25	20.40	15.725	16.15	19.125	23.375
Billets, P'gh, Chi, Canton, Newark, N. J., Watervliet, Syracuse, Balt	Subject to negotiation			Subject to negotiation		
Billets, forging, P'gh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Watervliet, Syracuse, Newark, N. J., Ft. Wayne, Titusville	21.25	20.40	15.725	16.15	19.125	23.375
Bars, h-r, P'gh, Chi, Canton, Dunkirk, Watervliet, Newark, N. J., Syracuse, Balt, Phila, Reading, Ft. Wayne, Titusville	25.00	24.00	18.50	19.00	22.50	27.50
Bars, c-f, P'gh, Chi, Cleve, Canton, Dunkirk, Newark, N. J., Syracuse, Balt, Phila, Reading, Ft. Wayne, Watervliet	25.00	24.00	18.50	19.00	22.50	27.50
Plates, P'gh, Middletown, Canton	29.00	27.00	21.50	22.00	26.50	30.50
Shapes, structural, P'gh, Chi	25.00	24.00	18.50	19.00	22.50	27.50
Sheets, P'gh, Chi, Middletown, Canton, Balt	36.00	34.00	26.50	29.00	32.50	36.50
Strip, h-r, P'gh, Chi, Reading, Canton, Youngstown	23.50	21.50	17 00	17.50	24.00	35.00
Strip, c-r, P'gh, Cleve, Newark, N. J., Reading, Canton, Youngstown	30.00	28.00	22.00	22.50	32.00	52.00
Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, P'gh, Newark, N. J., Phila	25.00	24.00	18.50	19.00	22.50	27.50
Wire flat, c-r, Cleve, Balt, Reading, Dunkirk, Canton	30.00	28.00	22.00	22.50	32.00	52.00
Rod, h-r, Newark, N. J. Syracuse	25.00	24.00	18.50	19.00	22.50	27.50
Tubing, seamless, P'gh Chi, Canton, (4 in. to 8 in.)	66.63	66.63	.....	63.30	.....	.....

SHELL STEEL

	per gross ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.60
18 in. and over	56.60

Basic openhearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are $2.00 higher; East Michigan, $3 higher.

Price Exceptions: Follansbee Steel Corp. permitted to sell at $13.00 per gross ton, f.o.b. Toronto, Ohio, above base price of $52.00.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

	per lb
Field grade	3.30¢
Armature	3.65¢
Electrical	4.15¢
Motor	5.05¢
Dynamo	5.75¢
Transformer 72	6.25¢
Transformer 65	7.25¢
Transformer 58	7.75¢
Transformer 52	8.55¢

F.o.b. Granite City, add 10¢ per 100 lb on field grade to and including dynamo. Pacific ports add 75¢ per 100 lb on all grades.

RAILS, TRACK SUPPLIES

(F.o.b. mill)

Standard rails, heavier than 60 lb No. 1 O.H., gross ton	$43.00
Angle splice bars, 100 lb	2.70
(F.o.b. basing points)	*per gross ton*
Light rails (from billets)	$45.00
Light rails (from rail steel)	44.00
	base per lb
Cut spikes	3.25¢
Screw spikes	5.40¢
Tie plate, steel	2.30¢
Tie plates, Pacific Coast	2.45¢
Track bolts	4.75¢
Track bolts, heat treated, to railroads	5.00¢
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25¢.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk)

(*Also Canton, O.)	base per lb
High speed	67¢
Straight molybdenum	54¢
Tungsten-molybdenum	57½¢
High-carbon-chromium*	43¢
Oil hardening*	24¢
Special carbon*	22¢
Extra carbon*	18¢
Regular carbon*	14¢

Warehouse prices east of Mississippi are 2¢ per lb higher; west of Mississippi 3¢ higher.

CLAD STEEL

Base prices, cents per pound

	Plate	Sheet
Stainless-clad No. 304, 20 pct, f.o.b. Pittsburgh, Washington, Pa.	18.00*	19.00
Nickel-clad 10 pct, f.o.b. Coatesville, Pa.	18.00	....
Inconel-clad 10 pct, f.o.b. Coatesville	25.00	....
Monel-clad 10 pct, f.o.b. Coatesville	24.00	....
Aluminized steel Hot dip, 20 gage, f.o.b. Pittsburgh	....	9.00

*Includes annealing and pickling.

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Basing Points Named	Pacific Coast Basing Points†
	base per keg	
Standard wire nails	$2.90	$3.40
Coated nails	2.90	3.40
Cut nails, carloads	3.85	....
	base per 100 lb	
Annealed fence wire	$3.20	$3.70
Annealed galv. fence wire	3.55	4.05
	base column	
Woven wire fence*	67	85
Fence posts, carloads	69	86
Single loop bale ties	66	91
Galvanized barbed wire**	72	82
Twisted barbless wire	72	....

*15½ gage and heavier. **On 80-rod spools in carload quantities.

†Prices subject to switching or transportation charges.

ROOFING TERNEPLATE

(F.o.b. Pittsburgh, 112 sheets)

	20x14 in.	20x28 in.
8-lb coating I.C.	$6.00	$12.00
15-lb coating I.C.	7.00	14.00
20-lb coating I.C.	7.50	15.00

ALLOY EXTRAS

Alloy Steel	Basic Openhearth		Electric Furnace	
	Bars and Bar-strip	Billets, Blooms, and Slabs	Bars and Bar-strip	Billets, Blooms, and Slabs
NE 8600	0.65¢	$13.00	$1.15	$23.00
NE 8700	0.70	14.00	1.20	24.00
NE 9400	0.75	15.00	1.25	25.00
NE 9700	0.65	13.00	1.15	23.00
NE 9800	1.30	26.00	1.80	36.00
NE 9900	1.20	24.00	1.55	31.00

The extras shown are in addition to the base price of $2.70 per 100 lb on finished products and $54 per gross ton on semifinished steel, major basing points, as shown in table, opposite page, and are in cents per pound when applicable to bars and bar-strip and in dollars per gross ton when applicable to billets, blooms and slabs. When acid openhearth is specified and acceptable, add to basic openhearth alloy differential 0.25¢ per lb for bars and bar-strip and $5 per gross ton for billets, blooms and slabs.

WELDED PIPE AND TUBING

Base discounts, f.o.b. Pittsburgh district and Lorain, Ohio, mills

(F.o.b. Pittsburgh only on wrought pipe) base price—$200.00 per net ton

Steel (buttweld)

	Black	Galv.
⅛-in.	63½	51
¼-in.	66½	55
⅜-in. to 3-in.	68½	57½

Wrought Iron (buttweld)

⅛-in.	24	3½
¼-in.	30	10
⅜-in. and ½-in.	34	16
¾-in.	38	18½
1-in.	37½	18

Steel (lapweld)

2-in.	61	49½
2½-in. and 3-in.	64	52½
3½-in. to 6-in.	66	54½

Wrought Iron (lapweld)

2-in.	30½	12
2½-in. to 3½-in.	31½	14½
4-in.	33½	18
4½-in. to 8-in.	32½	17

Steel (butt, extra strong, plain ends)

⅜-in.	61½	50½
½-in.	65½	54½
1-in. to 3-in.	67	57

Wrought Iron (same as above)

⅛-in.	25	6
¼-in.	31	12
1-in. to 2-in.	38	19½

Steel (lap, extra strong, plain ends)

2-in.	59	48½
2½-in. and 3-in.	63	52½
3½-in. to 6-in.	66½	56

Wrought Iron (same as above)

2-in.	33½	15½
2½-in to 4-in.	39	22½
4½-in. to 6-in.	37½	21

On buttweld and lapweld steel pipe jobbers are granted a discount of 5 pct. On l.c.l. shipments prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lapweld and one point lower discount, or $2 a ton higher on all buttweld.

BOILER TUBES

Seamless steel and lapweld commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft f.o.b. Pittsburgh, in carload lots.

	Seamless Cold-Drawn	Seamless Hot-Rolled	Lapweld, Hot-Rolled
2 in. O.D. 13 B.W.G.	15.03	13.04	12.38
2½ in. O.D. 12 B.W.G.	20.21	17.54	16.58
3 in. O.D. 12 B.W.G.	22.48	19.50	18.35
3½ in. O.D. 11 B.W.G.	28.37	24.62	23.15
4 in. O.D. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb or ft and over	Base
30,000 lb or ft to 39,999 lb or ft.	5 pct
20,000 lb or ft to 29,999 lb or ft.	10 pct
10,000 lb or ft to 19,999 lb or ft.	20 pct
5,000 lb or ft to 9,999 lb or ft.	30 pct
2,000 lb or ft or 4,999 lb or ft.	45 pct
Under 2,000 lb or ft	65 pct

CAST IRON WATER PIPE

Per Net Ton

6-in. and larger, del'd Chicago. $54.80
6-in. and larger, del'd New York. 52.20
6-in. and larger, Birmingham 46.00
6-in. and larger, f.o.b. cars, San Francisco or Los Angeles 69.40
6-in. and larger f.o.b. cars, Seattle. 71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger are $45 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect 3 pct tax on freight rates.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts

Base discount less case lots

Percent Off List

½ in. & smaller x 6 in. & shorter. 65½
9/16 & ⅝ in. x 6 in. & shorter. 63½
¾ to 1 in. x 6 in. & shorter 61
1⅛ in. and larger, all lengths. 59
All diameters over 6 in. long. 59
Lag, all sizes 62
Plow bolts 65

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller 62
9/16 to 1 in. inclusive 59
1⅛ to 1½ in. inclusive 57
1⅝ in. and larger 56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifin. Hexagon Nuts	U.S.S.	S.A.E.
Base discount less keg lots		
7/16 in. and smaller	..	64
½ in. and smaller	62	..
⅝ in. through 1 in.	..	60
9/16 in. through 1 in.	59	..
1⅛ through 1½ in.	57	58
1⅝ in. and larger	56	..

In full keg lots, 10 pct additional discount.

Stove Bolts

Consumer

Packages, nuts loose 71 and 10
In packages 71
In bulk 80

On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.

Large Rivets

(½ in. and larger)

Base per 100 Lb

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham $3.75

Small Rivets

(7/16 in. and smaller)

Percent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham 65 and 5

Cap and Set Screws

Consumer Percent Off List

Upset full fin, hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in. 64
Upset set screws, cup and oval points 71
Milled studs 46
Flat head cap screws, listed sizes. 36
Fillister head cap, listed sizes. 51

Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Div. certifies in writing the consumers need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	Base price per short ton
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. F.o.b. shipping point, cents per lb, ton lots.

Copper, electrolytic, 150 and 200 mesh 21½¢ to 23½¢
Copper, reduced, 150 and 200 mesh 20½¢ to 25½¢
Iron, commercial, 100 and 200 mesh 96 + % Fe 12½¢ to 15¢
Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots 4¢
Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe, drum lots 63¢
Iron, electrolytic, unannealed, 300 mesh and coarser, 99 + % Fe 30 to 33¢
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe. 42¢
Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe. 90¢
Aluminum, 100 and 200 mesh. *25¢
Antimony, 100 mesh 30¢
Cadmium, 100 mesh $1.40
Chromium, 100 mesh and finer. $1.25
Lead, 100, 200 & 300 mesh. 11½ to 15¢
Manganese 65¢
Nickel, 150 mesh 51½¢
Solder powder, 100 mesh. 8½¢ plus metal
Tin, 100 mesh 58¾¢
Tungsten metal powder, 98%-99%, any quantity, per lb $2.60
Molybdenum powder, 99%, in 200-lb kegs, f.o.b. York, Pa., per lb. $2.60
Under 100 lb $3.00

*Freight allowed east of Mississippi.

COKE

Furnace, beehive (f.o.b. oven)	Net Ton
Connellsville, Pa.	$7.50*
Foundry, beehive (f.o.b. oven)	
Fayette Co., W. Va.	8.10
Connellsville, Pa.	9.00
Foundry, Byproduct	
Chicago, del'd	13.75
Chicago, f.o.b.	13.00
New England, del'd	14.65
Kearny, N. J., f.o.b.	13.05
Philadelphia, del'd	13.28
Buffalo, del'd	13.40
Portsmouth, Ohio, f.o.b.	11.50
Painesville, Ohio, f.o.b.	12.15
Erie, del'd	13.15
Cleveland, del'd	13.20
Cincinnati, del'd	13.25
St. Louis, del'd	14.25
Birmingham, del'd	10.90

*Hand drawn ovens using trucked coal permitted to charge $8.60 per ton plus transportation charges.

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

Per 1000

Super-duty brick, St. Louis $68.50
First quality, Pa., Md., Ky., Mo., Ill. 54.40
First quality, New Jersey 59.35
Sec. quality, Pa., Md., Ky., Mo., Ill. 49.35
Sec. quality, New Jersey 51.95
No. 1 Ohio 45.60
Ground fire clay, net ton 8.05

Silica Brick

Pennsylvania and Birmingham $54.40
Chicago District 62.45
Silica cement, net ton (Eastern) 9.55

Chrome Brick

Per Net Ton

Standard chemically bonded, Balt., Plymouth Meeting, Chester $54.00

Magnesite Brick

Standard, Balt. and Chester $76.00
Chemically bonded, Baltimore 65.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in sacks (carloads) $43.48
Domestic, f.o.b. Chewelah, Wash.
in bulk 22.00
in sacks 26.00

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports)*

Per Gross Ton

Old range, bessemer, 51.50 $4.75
Old range, non-bessemer, 51.50. 4.60
Mesaba, bessemer, 51.50 4.60
Mesaba, non-bessemer, 51.50 4.45
High phosphorus, 51.50 4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendment to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-48 Ann.
**Philadelphia	$3.518	$4.872[1]	$4.768a	$3.922	$4.772	$3.606	$3.666	$3.822	$4.172	$5.816	$6.866	$7.072	$8.172
New York	3.59	4.613[3]	5.110	3.976[6]	4.772	3.768	3.758	3.853	4.203	5.858	6.908	7.103	8.203
Boston	3.744	4.744[9]	5.224[9]	4.106	4.715	3.912	3.912	4.044	4.244	6.012	7.062	7.194	8.394
Baltimore	3.394	4.852	4.894	3.902	4.752	3.594	3.759	3.802	4.152	....	....	....	....
Norfolk	3.771	4.965	5.371	4.165	4.865	3.971	4.002	4.065	4.265	....	....	....	....
Chicago	3.25	4.20	5.231	3.60	4.65[17]	3.55	3.55	3.50	3.85	5.60	6.65	6.65	7.90
Milwaukee	3.387	4.337[3]	5.272[4]	3.737	4.787[17]	3.687	3.687	3.637	3.987	5.837	6.887	6.887	7.987
Cleveland	3.35	4.40	4.877[4]	3.60	4.45	3.40	3.588	3.35	3.85	5.806	6.856	6.65	7.75
Buffalo	3.35	4.40	4.754	3.819	4.669	3.63	3.40	3.35	3.85	5.60	6.65	6.65	7.75
Detroit	3.45	4.50	5.004	3.70	4.859[17]	3.609	3.681	3.45	3.90	5.93	6.98	6.959	8.059
Cincinnati	3.425	4.475[3]	4.825[5]	3.675	4.711	3.661	3.691	3.611	4.111	5.95	7.00	7.011	8.261
St. Louis	3.397	4.347[3]	5.172[4]	3.747	4.931[17]	3.697	3.697	3.647	4.131	5.981	7.031	7.031	8.131
Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.85	5.60	6.65	6.65	7.90
St. Paul	3.50	4.46	5.257[4]	3.86	5.102[17]	3.813[13]	3.813[13]	3.763[13]	3.461	5.94	5.99	7.361	8.461
Omaha	3.865	5.443	5.608[4]	4.215	....	4.165	4.165	4.115	4.543	....	....	....	....
Indianapolis	3.518	4.568	4.918	3.768	4.741	3.63	3.63	3.58	4.00	5.93	6.98	6.98	8.23
Birmingham	3.45	....	4.75	3.70	....	3.55	3.55	3.50	4.53	....	....	....	....
Memphis	3.965[7]	4.66	5.268	4.215	....	4.065	4.065	4.015	4.33	....	....	....	....
New Orleans	4.058*	5.079	5.358	4.308	....	4.158	4.158*	4.108*	4.729	....	....	....	....
Houston	3.763	5.573	6.313[1]	4.313	....	4.25	4.25	3.75	6.473[3]	7.223	8.323	8.323	9.373
Los Angeles	5.00	7.203	6.104	4.95	5.613[15]	4.95	4.65	4.40	5.683	8.204	9 404	9.304	10.454
San Francisco	4.55[14]	7.304	6 354	4.50[14]	7.333[17]	4.65[14]	4.35[14]	4.15[14]	5.433	8.304	9 404	9.404	10.454
Seattle	4.65[12]	7.054	5.954	4.25[12]	....	4.75[12]	4 45[12]	4.35[12]	5.883	....	9.404	....	....
Portland	4.65[11]	6.604	5.754	4.75[11]	....	4.85[11]	4.45[11]	4.45[11]	5.633	8.304	9.404	8.304	9.404
Salt Lake City	4.530[17]	....	6.171[3]	5.53[17]	....	4.98[17]	4.98[17]	4.88[17]	6.00	....	....	....	....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED: Sheets, 400 to 1499 lb; strip, extras on all quantities; bars, 1500 lb base.

NE ALLOY BARS: 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 199 lb. (7) 400 to 1499 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 lb and over. (15) 1000 lb and over. (16) 1500 lb and over. (17) 2000 lb and over. (18) 3500 lb and over.

(*) Philadelphia: Galvanized sheet, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

*Add 0.271¢ for sizes not rolled in Birmingham.

**City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

PIG IRON PRICES

Maximum per gross ton, established by OPA Oct. 22, 1945. Prices do not reflect 3 pct tax on freight.

BASING POINT PRICES					
Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	$26.25	$26.75	$27.25	$27.75	....
Birdsboro	26 25	26.75	27.25	27.75	$31.25
Birmingham	20.75	22.13	....	26.75	....
Buffalo	24.75	25.75	26.25	26.75	31.25
Chicago	25.25	25 75	25.75	26.25	.....
Cleveland	25.25	25.75	25.75	26.25	.....
Detroit	25.25	25.75	25.75	26.25	.....
Duluth	25.75	26.25	26.25	26.75	.....
Erie	25.25	25.75	26.25	26.75	.....
Everett	26.25	26.75	27.25	27.75	.....
Granite City	25.25	25 75	25.75	26.25	.....
Hamilton	25.25	25 75	25.75	....	.....
Neville Island	25.25	25.75	25.75	26.25	.....
Provo	23.25	23.75	....	....	.....
Sharpsville [1]	25.25	25.75	25.75	26.25	.....
Sparrows Point	26.25	26.75	.....	.....	.....
Steelton	26.25	....	....	....	31.25
Swedeland	26.25	26.75	27.25	27.75	.....
Toledo	25.25	25 75	25.75	26.25	.....
Youngstown	25.25	25.75	25.75	26.25	.....

DELIVERED PRICES (BASE GRADES)						
Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Boston	Everett	$ .50	$26.75	$27.25	$27.75	$28.25	....
Boston	Birdsboro-Steelton	4.02	....	....	....	....	$38.27
Brooklyn	Bethlehem	2.50	28.75	29.25	29.75	30.25	....
Brooklyn	Birdsboro	2.92	....	....	....	....	34.17
Canton	Cle, Yngstn, Sharpsvll	1.39	26.64	27.14	27.14	27.64	....
Canton	Buffalo	3.19	....	....	....	....	34.44
Cincinnati	Birmingham	4.06	24.81	26.19	....	....	....
Cincinnati	Hamilton	1.11	....	....	26.86	....	....
Cincinnati	Buffalo	4.40	....	....	....	....	35.65
Jersey City	Bethlehem	1.53	27.78	28.28	28.78	29.28	....
Jersey City	Birdsboro	1.94	....	....	....	....	33.19
Los Angeles	Provo	4.95	28.20	28.70	....	....	....
Los Angeles	Buffalo	15.41	....	....	....	....	46.66
Mansfield	Cleveland & Toledo	1.94	27.19	27.69	27.69	28.19	....
Mansfield	Buffalo	3.36	....	....	....	....	34.61
Philadelphia	Swedeland	.84	27.09	27.59	28.09	28.59	....
Philadelphia	Birdsboro	1.24	....	....	....	....	32.49
San Francisco	Provo	4.95	28.20	28.70	....	....	....
San Francisco	Buffalo	15.41	....	....	....	....	46.66
Seattle	Provo	4.95	28.20	28.70	....	....	....
Seattle	Buffalo	15.41	....	....	....	....	46.66
St Louis	Granite City	.50	25.75	26.25	26.25	26.75	....
St. Louis	Buffalo	7.07	....	....	....	....	39.32

(1) Struthers Iron & Steel Co., Struthers, Ohio, may charge 50¢ a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

Charcoal pig iron base prices for Lyles, Tenn., and Lake Superior furnaces, $33.00 and $34.00, respectively. Newberry Brand of Lake Superior charcoal iron $39.00 per g.t., f.o.b. furnace, by order L 39 to RPS 10. Apr. 11, 1945, retroactive to Mar. 7, 1945. Delivered to Chicago, $42.34. High phosphorus iron sells at Lyles, Tenn., at $28.50.

Basing point prices are subject to switching charges; Silicon differentials (not to exceed 50¢ a ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); Phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over; Manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. Effective Mar. 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron and bessemer ferro-silicon up to and including 14.00 pct silicon covered by RPS 10 as amended Feb. 14, 1945. Silvery iron, silicon 6.00 to 6.50 pct. C/L per g.t., f.o.b. Jackson, Ohio—$31.25; f.o.b. Buffalo—$32.50. Add $1.00 per ton for each additional 0.50 pct Si. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for prices of comparable analysis.

Ferromanganese

78-82% Mn, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn. Carload lots (bulk) $135.00
Less ton lots (packed) 148.50
F.o.b. Pittsburgh 139.50
$1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Ferromanganese Briquets

Contract prices per pound of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 66% contained Mn. Add 0.25¢ for spot sales.

	Eastern	Central	Western
Carload, bulk ..	6.05¢	6.30¢	6.60¢
Ton lots	6.65¢	7.55¢	8.55¢
Less ton lots...	6.80¢	7.80¢	8.80¢

Manganese Metal

Contract basis, lump size, per pound of metal, f.o.b. shipping point with freight allowed. Spot sales add 2¢ per lb.
96-98% Mn, .2% max. C, 1% max. Si, 2% max. Fe.
Carload, bulk ..... 30¢
L.c.l. lots ..... 32¢

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.
Carloads ..... 34¢
Ton lots ..... 36¢
Less ton lots ..... 38¢

Spiegeleisen

Maximum base contract prices per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$35.00	$36.00
Less ton	47.50	48.50
F.o.b. Pittsburgh, Chicago	40.00	

Low-Carbon Ferromanganese

Contract prices per pound of manganese contained, lump size, f.o.b. shipping point, freight allowed to destination, eastern zone. Add 0.25¢ for spot sales.

	Carloads, Ton Bulk	Lots	Less Ton
0.06% C, 0.06% P, 90% Mn	23.00¢	23.40¢	23.65¢
0.10% max. C, 1% or 2% max. Si .	23.00¢	23.40¢	23.65¢
0.15% max. C, 1% or 2% max. Si...	22.00¢	22.40¢	22.65¢
0.30% max. C, 1% or 2% max. Si...	21.00¢	21.40¢	21.65¢
0.50% max. C, 1% or 2% max. Si...	20.00¢	20.40¢	20.65¢
0.75% max. C, 7.00% max. Si....	16.00¢	16.40¢	16.65¢

Electric Ferrosilicon

OPA maximum base price cents per pound contained Si, lump size in carloads, f.o.b. shipping point with freight allowed.

	Eastern	Central	Western
50% Si ...	6.65¢	7.10¢	7.25¢
75% Si ...	8.05¢	8.20¢	8.75¢
80-90% Si..	8.90¢	9.05¢	9.55¢
90-95% Si..	11.05¢	11.20¢	11.65¢

Silvery Iron

Si 14.01 to 14.50%, $45.50 per G. T. f.o.b. Jackson, Ohio. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 per ton for low impurities, not to exceed: P—0.05%, S—0.04%, C—1.00%. Covered by MPR 405.

Silicon Metal

OPA maximum base price per pound of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb, packed. Add 0.25¢ for spot sales.

	Eastern	Central	Western
96% Si, 2% Fe..	13.10¢	13.55¢	16.50¢
97% Si, 1% Fe..	13.45¢	13.90¢	16.80¢

Ferrosilicon Briquets

OPA maximum base price per pound of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% Si. Add 25¢ for spot sales.

	Eastern	Central	Western
Carload, bulk ..	3.35¢	3.50¢	3.65¢
2000 lb-carload.	3.80¢	4.20¢	4.25¢

Silicomanganese

Contract basis lump size, per pound of metal, f.o.b. shipping point with freight allowed. Add 25¢ for spot sales. 65-70% Mn, 17-20% Si, 1.5% max. C.
Carload, bulk ..... 6.05¢
2000 lb to carload ..... 6.70¢
Briquet, contract basis, carlots, bulk freight allowed, per lb..... 5.80¢
2000 lb to carload ..... 6.30¢
Less ton lots ..... 6.55¢

Ferrochrome

(65-72% *Cr*, 2% *max. Si*)

OPA maximum base contract prices per pound of contained Cr, lump size in carload lots, f.o.b. shipping point, freight allowed to destination. Add 0.25¢ per lb contained Cr for spot sales.

	Eastern	Central	Western
0.06% C	23.00¢	23.40¢	24.00¢
0.10% C	22.50¢	22.90¢	23.50¢
0.15% C	22.00¢	22.40¢	23.00¢
0.20% C	21.50¢	21.90¢	22.50¢
0.50% C	21.00¢	21.40¢	22.00¢
1.00% C	20.50¢	20.90¢	21.50¢
2.00% C	19.50¢	19.90¢	21.00¢
66-71% Cr, 4-10% C ...	13.00¢	13.40¢	14.00¢
62-66% Cr, 5-7% C	13.50¢	13.90¢	14.50¢

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low-carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N. High-carbon type: 66-71% Cr, 4-5% C, 0.75% N. Add 5¢ per lb to regular high-carbon ferrochrome price schedule.

Ferrochrome Briquets

Contract prices per pound of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 60% contained chromium. Add 0.25¢ for spot sales.

	Eastern	Central	Western
Carload, bulk ..	8.25¢	8.55¢	8.95¢
Ton lots	8.75¢	9.25¢	10.75¢
Less ton lots...	9.00¢	9.50¢	11.00¢

Calcium—Manganese—Silicon

Contract prices per pound of alloy, lump size, f.o.b. shipping point, freight allowed to destination.
16-20% Ca, 14-18% Mn, 53-59% Si. Add 0.25¢ for spot sales.

	Eastern	Central	Western
Carloads	15.50¢	16.00¢	18.05¢
Ton lots	16.50¢	17.35¢	19.10¢
Less ton lots..	17.00¢	17.35¢	19.60¢

Calcium Metal

Eastern zone contract prices per pound of metal, f.o.b. shipping point, freight allowed to destination. Add 5¢ for spot sales. Add 0.9¢ for central zone; 0.49¢ for western zone.

	Cast	Turnings	Distilled
Ton lots $1.80		$2.30	$5.00
Less ton lots...	2.30	2.80	5.75

Chromium—Copper

Contract price per pound of alloy, f.o.b. Niagara Falls, freight allowed east of the Mississippi. 8-11% Cr, 88-90% Cu, 1.00% max. Fe, 0.50% max. Si. Add 2¢ for spot sales.
Shot or ingot ..... 45¢

Ferroboron

Contract prices per pound of alloy, f.o.b. shipping point, freight allowed to destination. Add 5¢ for spot sales. 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% Max. C.

	Eastern	Central	Western
Ton lots	$1.20	$1.2075	$1.229
Less ton lots..	1.30	1.3075	1.329

Manganese—Boron

Contract prices per pound of alloy, f.o.b. shipping point, freight charges allowed. Add 5¢ for spot sales.
75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.

	Eastern	Central	Western
Ton lots	$1.89	$1.903	$1.935
Less ton lots...	2.01	2.023	2.055

Nickel—Boron

Spot and contract prices per pound of alloy, f.o.b. shipping point, freight allowed to destination.
15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

	Eastern	Central	Western
11,200 lb or more ...	$1.90	$1.9125	$1.9445
Ton lots	2.00	2.09125	2.0445
Less ton lots.	2.10	2.1125	2.1445

Other Ferroalloys

Ferrotungsten, standard grade lump or ¼X down, packed f.o.b. plant at Niagara Falls, New York, Washington, Pa., York, Pa., per pound contained tungsten, 10,000 lb or more.... $1.90
Ferrovanadium, 35-55%, contract basis, f.o.b. plant, usual freight allowances, per pound contained V.
Openhearth $2.70
Crucible $2.80
Primos $2.90
Cobalt, 97% min., keg packed, contract basis, f.o.b. producers plant, usual freight allowances, per pound of cobalt metal $1.50
Vanadium pentoxide, 88-92% V_2O_5 technical grade, contract basis, any quantity, per pound conatined V_2O_5. Spot sales add 5¢ per lb contained V_2O_5..... $1.10
Silcaz No. 3, contract basis, f.o.b. plant with usual freight allowances, per pound of alloy.
carload lots ..... 25¢
2000 lb to carload ..... 26¢
Silvaz No. 3, contract basis, f.o.b. plant with freight allowances, per pound of alloy.
Carload lots .. .. 58¢
2000 lb to carload..... 59¢
Grainal, f.o.b. Bridgeville, Pa., freight allowed 50 lb and over, max. based on rate to St. Louis
No. 1 ..... 87.5¢
No. 6 ..... 60¢
No. 79 ..... 45¢
Bortram, f.o.b. Niagara Falls
Ton lots, per lb..... 45¢
Less ton lots, per lb..... 50¢
Ferrocolumbium, 50-60%, contract basis, f.o.b. plant with freight allowances, per pound contained Cb.
2000-lb lots $2.25
Under 2000-lb lots $2.30
Ferrotitanium, 40-45%, 0.10% C. max. f.o.b. Niagara Falls, N. Y., ton lots, per pound contained Ti $1.23
Less ton lots $1.25
Ferrotitanium, 20-25%, 0.10% C. max., ton lots, per pound contained titanium $1.35
Less ton lots $1.40
High-carbon ferrotitanium, 15-20%, 6-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y. freight allowed east of Mississippi, north of Baltimore and St. Louis, per carload $142.50
Ferrophosphorus, 18% electric or blast furnaces, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equalled with Rockdale, Tenn., per gross ton $58.50
Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Sigio), Tenn., $3 unitage freight equalized with Nashville, per gross ton $75.00
Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., any quantity, per pound contained Mo. ..... 95¢
Calcium molybdate, 40-45%, f.o.b. Langeloth and Washington, Pa., any quantity, per pound contained Mo ..... 80¢
Molybdenum oxide briquets, 48-52% Mo g.o.b. Langeloth, Pa., per pound contained Mo..... 80¢
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per pound contained Mo ..... 80¢
Zirconium, 35-40%, contract basis, f.o.b. producer's plant with freight allowances, per pound of alloy. Add ¼¢ for spot sales
Carload lots ..... 14¢
Zirconium, 12-15%, contract basis, lump f.o.b. plant usual freight allowances, per pound of alloy
Carload, bulk ..... 4.60¢
Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, carload, bulk ..... 5.75¢
Ton lots ..... 7.25¢
Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per pound.
Car lots ..... 8.00¢
Ton lots ..... 8.75¢
Less ton lots ..... 9.25¢

We don't guess —we must know!

ALL MATERIALS that go into Woodworth gages are tested in one of several specially built wear-test machines developed by the N. A. Woodworth Company to supplement its ultra-modern laboratory facilities.

To insure long-lasting precision hundreds of materials—from glass to beryllium copper—have been checked to prove wearability. *We don't guess—we must know!*

The test machine operates with a combined rotary and reciprocating motion, to simulate exactly the "wringing" effect of a gage in actual use. At the same time, pressure is applied against the wearing surface of the gage, thus creating friction. Woodworth test gages are subjected to punishing wear-tests as high as 350,000 cycles, each cycle consisting of an up and down stroke.

And then—each gage must pass rigorous tests in our own high production plants for accuracy and wearability. *We don't guess—we must know!*

Woodworth precision gages and tools—designed to give users the longest accurate service life at the lowest possible operating cost—will help industry build the finest peacetime products this nation has ever known.

★ ★ ★

Close-up showing test gage reciprocating under pressure between wear blocks.

THE WOODWORTH WEAR TESTER

PATENT U. S. A. NO. 2362554 CANADA NO. 42644

ACCURACY YOU W CAN TRUST

WOODWORTH

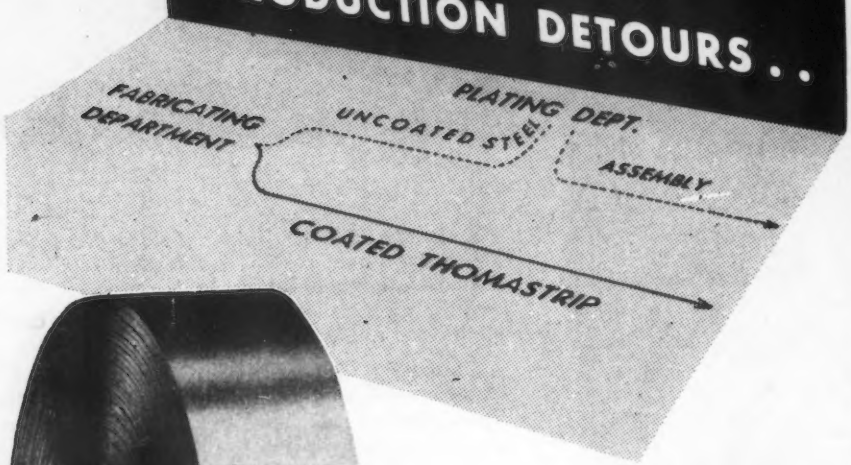
N. A. WOODWORTH CO., SALES DIVISION, 1300 E. NINE MILE ROAD • DETROIT 20, MICHIGAN

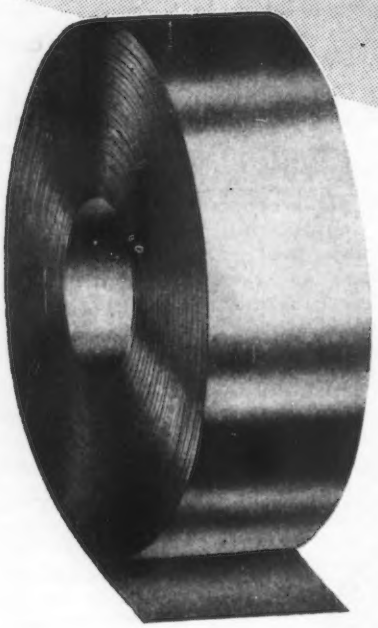
PRECISION GAGES • PRECISION MACHINED PARTS • PRECISION TOOLS

COATED

ThomaStrip

SAVES COSTLY PRODUCTION DETOURS . .





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ELECTRO-COATED ZINC, COPPER, NICKEL AND BRASS . . . HOT DIPPED TIN AND SOLDER . . . LACQUER COATED IN COLORS . . . UNCOATED PRECISION STRIP, CARBON AND ALLOY SPECIALTIES

★

• Thomas cold rolled strip steel with non-ferrous finishes are used for a final finish or as a basis for further plating. In either case, they reduce or eliminate costly production operations in your plant. Thomas finishes of brass, copper, nickel, zinc, tin, solder, and lacquer in colors provide a uniform coating on the inside and outside of complicated or mildly formed parts . . . Remember, too, ThomaStrip has precision dimensions . . . it meets your specifications. Consult Thomas engineers for an economical, all around finish for your product. Write today.

THE THOMAS STEEL CO. • WARREN, OHIO

COLD ROLLED STRIP STEEL SPECIALISTS

Discusses Disposal Of Surplus Property At Cleveland Mee

Cleveland

• • • **"You want to know** how th disposal of steel and metals is accom plished. In the first place, the author ity to make and complete sales is en tirely decentralized. The man you tal to across the desk or his immediat supervisor is authorized to close th transaction," Henry W. Cornell, As sistant Director, Office of Surplu Property, told the Steel Product Warehouse Assn. recently.

"Usable material for which there i a known market and use is priced an priced to sell in volume, taking int consideration all factors such as con dition, sizes, alloys, location and las but not necessarily least, the fact tha you are buying from a strange an intermittent source of supply.

"All buyers are treated equally whether user buyers or warehous buyers. All other material which i non-standard by very special alloy o size, which is in poor condition or i nominal amounts of $300 or less, i widely offered by sealed bids or so called "spot" sales, and in some in stances may be auctioned off.

"Each office has the inventory of its own area readily at hand. In addition the national inventory of metals and high pressure valves, broken down into 10 categories of like material, is run off, one category every two or three days, so that the availability on a national basis is known to each office. By teletype hook-up with the central inventory, spot information on new declarations is readily available. All sales made are published by the local office each week, together with the names of the buyers and the prices paid.

"You should not confuse what we are doing with the sales made by the contractor with the price approval of the contracting government agency during the period of contract termination. After all, this is the contractor's material, and in the interests of prompt termination and quick plant clearance the contracting agency is permitted by SPA Regulation to approve sales at certain percentages to the contractor for his own use, and at other percentages for uses beyond his own. The discretion down to these limits is with the contracting agency. In the event that the contractor does not want the material himself, or cannot or does not want to sell it to

ONE DOES THE WORK OF 3!
6000 lbs.
6000 lbs.
"I'M MUSCLE MIKE THE BRAWNY MIDGET"
TO PILE UP ½ TO 2/3 DOLLAR SAVINGS
WITH 3 TIMES LESS FATIGUE

It's Yours to Use *FREE* in Your Own Plant For 3 Days!

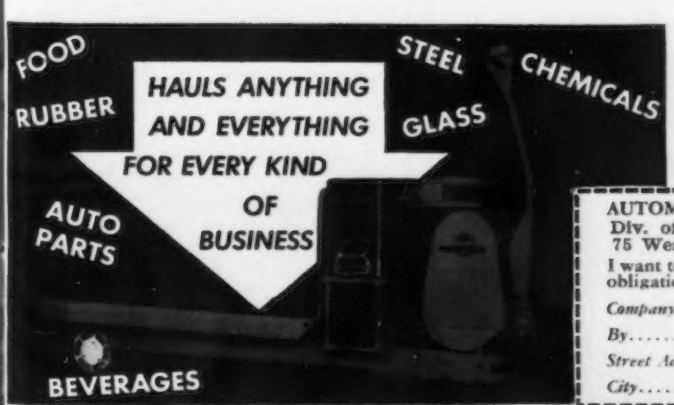
to demonstrate it will cut *YOUR* handling costs at least IN HALF

All industry is using this Miracle Electric Truck. In its motor is a Muscle Mike . . . a brawny midget of electric power that moves up to 6000 pounds with amazing "touch-of-your-thumb" ease.

Its name is Automatic Transporter. You haven't a handling job it can't lick. One man or girl at the control buttons does the work of three husky laborers. That's two-thirds saving in labor alone. Forget about drudgery and fatigue. It's next to nothing. Take it in and out of tight places that would put even hand trucks to shame. It comes through for you without a whimper.

But don't take our word for it. Put it to the test . . . put it over the severest hauling hurdles in your own plant. See if it doesn't do for you, the great job it has been doing for industry everywhere. Mail the coupon, and we will arrange delivery. First come, will of course, be first served. There is absolutely no obligation to buy . . . no strings attached whatsoever.

***Remember: Only* AUTOMATIC *Makes the* TRANSPORTER**



TRANSPORTER

A PRODUCT OF AUTOMATIC

LIGHTENS LIFE'S LOADS

AUTOMATIC TRANSPORTATION COMPANY
Div. of The Yale & Towne Mfg. Co.
75 West 87th Street, Chicago 20, Illinois

I want to put Automatic Transporter to work for me for 3 days free of all cost and obligation. Deliver it to my plant at as early a date as possible.

Company Name.....

By.....*Position*.....

Street Address.....

City.....*State*.....

SHELDON Vernon

Now Available!

Coming off the new production lines in Chicago, the SHELDON-built SHELDON-Vernon Precision Machine Tools* are now available at the same moderate prices that made them first in the moderate priced field. Built in the new modern SHELDON plant which is equipped with every advanced machine tool building facility, they are better than ever—even more accurate, more rugged and better finished.

Lighter and smaller and less costly than machine tools of equal accuracy, they provide a faster, more convenient and economical means of doing all but the heaviest operations.

Write for Bulletin on:

*SHELDON-Vernon Horizontal Milling Machine

*SHELDON-Vernon Vertical Milling Machine and Jig Borer

*SHELDON-Vernon 12" Shaper

Builders of Good Lathes Since 1919

SHELDON MACHINE CO., INC.
4210 N. Knox Ave., Chicago 41, U.S.A.

others within approvable price limitations, then the material becomes government-owned and hence surplus to the owning agency, and is declared to RFC.

"Broad sales policies and priorities are set by the SPA under the Surplus Property Act, and are being redefined and interpreted by regulations and supplemental orders issued from time to time by the SPA.

"Within the RFC, our job in metals proves to be largely a merchandising effort to sell material which at best

New Officers

Cleveland

• • • Regional officers and trustees for 1946 here at the annual meeting of the Steel Products Warehouse Assn., Inc., are:

Cleveland regional group: Chairman, S. M. Friedman, Nottingham Steel Co., vice-chairman, Robert Cole, Ohio Steel & Supply Co.; secretary, David Moritz, Regent Steel Co. and treasurer, H. J. Mervis, Singer Steel Co.

Chicago regional group: Chairman, Thomas J. Reid, Century Steel Corp.; vice-chairman, S. E. Hokin, Hokin Steel & Tin Plate Co.; secretary, E. A. Hennessy, Lafayette Steel Corp., and treasurer, H. A. Greenberg, Western Sheet Steel Co.

Detroit regional group: Chairman, L. J. Carolin, The Stanton Steel Co., Center Line, Mich.; vice-chairman, B. G. Schroeder, Schroeder Steel Sales Co., and secretary-treasurer, S. H. Greenbaum, Bernard Epps & Company.

Valley regional group: Chairman, J. E. Lavine, Union Steel Supply Co., Warren; vice-chairman, J. H. Frankle, Metal Products Co., Niles and secretary-treasurer, R. R. Cook, Hynes Steel Products Co., Youngstown.

Regional Trustees for 1946 are as follows:

Cleveland: S. M. Friedman, Nottingham Steel Co. and Harry Resnick, Universal Steel Co.

Chicago: Thomas J. Reid, Century Steel Corp. and H. F. Alpirn, Briggs & Turivas.

Detroit: L. J. Carolin, The Stanton Steel Co. and Joseph Gendelman, National Sheet Steel Co.

Valley: J. E. Lavine, Union Steel Supply Co. and H. B. Hoffman, The Wilkoff Co.

Trustees at large: Philip P. Brown, Reliance Steel Div., Detroit Steel Corp., Cleveland; Bernhard Gordon, Caine Steel Co., Chicago; C. Warren Garvey, Guardian Steel Corp., Detroit; J. D. Finnegan, Hynes Steel Products Co., Youngstown.

You can see

PSF QUALITY

as well as Prove it...

One glance at the typical car truck bolster and side frame castings, illustrated above, gives you a clear impression of the sound, clean-cut strength and uniform grain structure that characterize *all* PSF Castings. But you can go much farther than that. In PSF's modern laboratories, you can get check-tests on strength, hardness, analysis and texture . . . you can even utilize the best proof of all—the penetrating eye of a million-volt X-Ray.

• PSF employs the latest methods and equipment to produce *quality* castings—carbon or alloy steels, up to 100,000 pounds. Let us figure on *your* work.

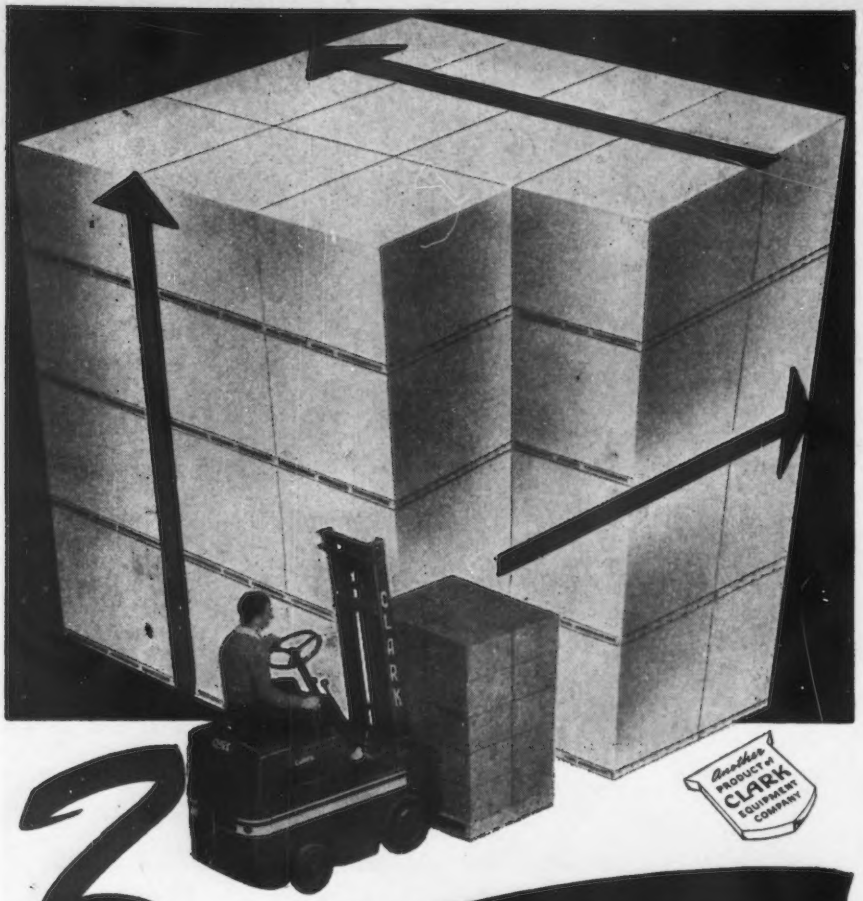
47 YEARS OF STEEL CASTING KNOWLEDGE

Pittsburgh STEEL FOUNDRY CORPORATION

Glassport, Pa. · Fort Pitt Steel Casting Div., McKeesport, Pa. · Pittsburgh Spring and Steel Co. Div., Pittsburgh, Pa.

Sales Offices: NEW YORK · PHILADELPHIA · CHICAGO · CLEVELAND · CINCINNATI · AKRON · WASHINGTON

W&D 9892



3 DIMENSIONAL USE OF SPACE THROUGH THE TIERING SYSTEM!

CLARK fork trucks utilize all factors in material handling

- ✔ High stacking utilizes "ceiling heights" or "air rights."
- ✔ Speed in handling utilizes time.
- ✔ 24 hour a day performance utilizes round the clock availability.
- ✔ Low cost operation and long life utilize savings on investment.
- ✔ Clark Fork Truck performance utilizes all factors in material handling.

CLARK TRUCTRACTOR, 1021 James Street, BATTLE CREEK, MICHIGAN

Products of CLARK • INDUSTRIAL TRUCKS AND TRACTORS • BOOSTER UNITS • EASY ROLL TRAILER AXLES AXLES FOR TRUCKS AND BUSES • GEARS AND FORGINGS • ELECTRIC STEEL CASTINGS • METAL SPOKE WHEELS TRANSMISSIONS • AXLE HOUSINGS • RAILWAY TRUCKS • BLIND RIVETS • HIGH-SPEED DRILLS AND REAMERS

has lost some of its luster since it i not coming from current productio or from the original private manu facturer. However, we do occasionall run into materials in such short sup ply that the demand exceeds the sup ply — sometimes overwhelmingly. I such cases, we endeavor to divide th material fairly and to do the mos good. Generally a proportion of 10 t 15 pct is set aside to warehouses, both as a measure of fairness and as service to really small business. I this activity we seek also the aid o Smaller War Plants Corp.

"Among the agencies and groups o buyers granted special priority buy ing right by the Surplus Property Act are: Federal agencies, local govern ments, nonprofit institutions, veterans farmers and farmers' cooperatives and the Smaller War Plants Corp. This latter government agency enjoys certain buying preference in the pro curement of property to aid small business and veterans. Smaller War Plants is charged with the responsi bility of making surveys from time to time and bringing to the attention of the Surplus Property Administrator the needs and requirements of small business.

"These special exceptions were written into the Surplus Property Act to guarantee that surplus property of all types be put to the widest possible use and all urgent needs for property or materials of any kind be satisfied.

"This has been, and is, a vast job of sales organization to set up in a very limited time, but this looks and acts each day more like a good commercial house and we would like to do some business with you. Naturally, any sales job as gigantic and as widely distributed as that of surplus disposal develops both criticisms of existing services and recommendations for future improvement."

Cleveland Graphite Loses

Cleveland

• • • The Cleveland Graphite Bronze Co. reports net sales for the nine months ended Sept. 30, of $38,642,900, and an estimated profit of $963,068. After preferred dividends this equals $2.69 per share on the 321,920 shares of common stock after all charges, including federal taxes now in effect and estimated reserves for renegotiation and contingencies.

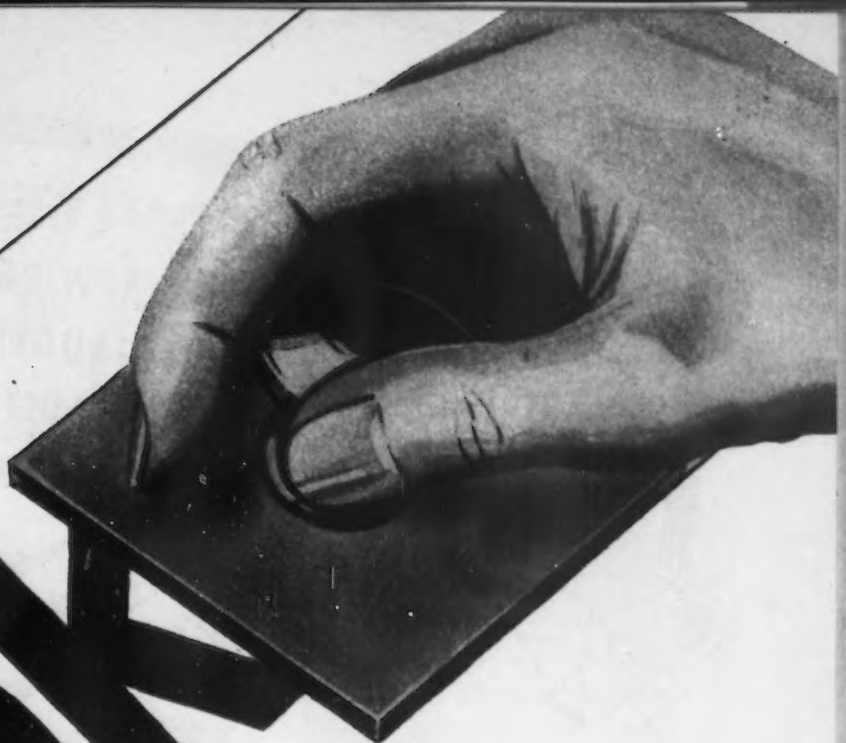
The company reported net sales of $44,134,507 for the comparable period in 1944 and an estimated profit of $1,418,492, equivalent to $4.09 per share on the common stock.

WHEN YOU

CALL SALEM

ABOUT HEATING FURNACES

STEP 5



OK

...YOU FLASH THE GREEN LIGHT

On new heating furnaces or related equipment, Salem engineers work closely with you and your staff.

After preliminary spade work, a Salem heating engineer checks over final plans and drawings with you. Before you give us the green light for construction, you have the opportunity of analyzing all details of the installation in light of your production. Thus you assure yourself of maximum efficiency in the proposed installation.

The detailed preliminary planning embraces exchange of ideas between you and Salem's heating men, preparation of visual roughs, testing, and the incorporation of new innovations you want for lowest cost operation.

Production efficiency, as you well know, depends upon thoroughness of planning and workmanship. Salem's step by step planning gives you the kind of heating installation you want for competitive production.

CALL SALEM, originators of Engineered Heat and builders of the world's largest rotary forge furnace, for any type, size, or style of heating furnace or related equipment.

NOTE: Write for Salem's new 16-page, illustrated booklet—"Engineered Heat," complete with easy-to-use heating and temperature charts.

SALEM

ENGINEERING COMPANY

SALEM, OHIO

SALEM ENGINEERING COMPANY

Engineered Heat

The men who make TURNER *gauges*

Any gauge is only as good as the men who make it. The men who make Turner Gauges are expert craftsmen, men who are never satisfied with anything less than perfection.

Pittsburgh Equitable Meter Co. Changes Name

Pittsburgh

• • • **The Pittsburgh Equitable Meter Co. has now become the Rockwell Mfg. Co. in an effort to reflect a broader manufacturing scope than represented by the former name.**

Col. W. F. Rockwell

Originally a manufacturer of gas meters and regulators, during the last five years the company has absorbed National Meter Co., Brooklyn, a producer of liquid meters; Delta Mfg. Co., Milwaukee, and its subsidiary V. & O. Press Co., Inc., Hudson, N. Y.; Edward Valve & Mfg. Co., Inc., East Chicago, Ind.; Crescent Machine Co., Leetonia, Ohio; and Monessen Foundry & Machine Co., Monessen, Pa.

The Pittsburgh Equitable Meter Co., however, will be continued as a subsidiary of the Rockwell Mfg. Co. The company's chairman of the board and president is Willard F. Rockwell who organized Equitable Meter & Mfg. Co., Pittsburgh, merged with Pittsburgh Meter Co. in 1927. Other officers are Willard F. Rockwell, Jr., vice president and general manager, J. Frank Drake, vice president, A. J. Kerr, vice president in charge of sales, W. S. Potter, vice president in charge of research, and H. A. Phillips, vice pres. and secretary.

The Rockwell Mfg. Co. manufactures meters, regulators and instruments for the measurement and control of liquids and gases; lubricated plug valves; cast and forged steel valves for high pressures and high temperatures; wood and metal working machine tools for homecraft and industry.

Settles Truck War Claims

South Bend, Ind.

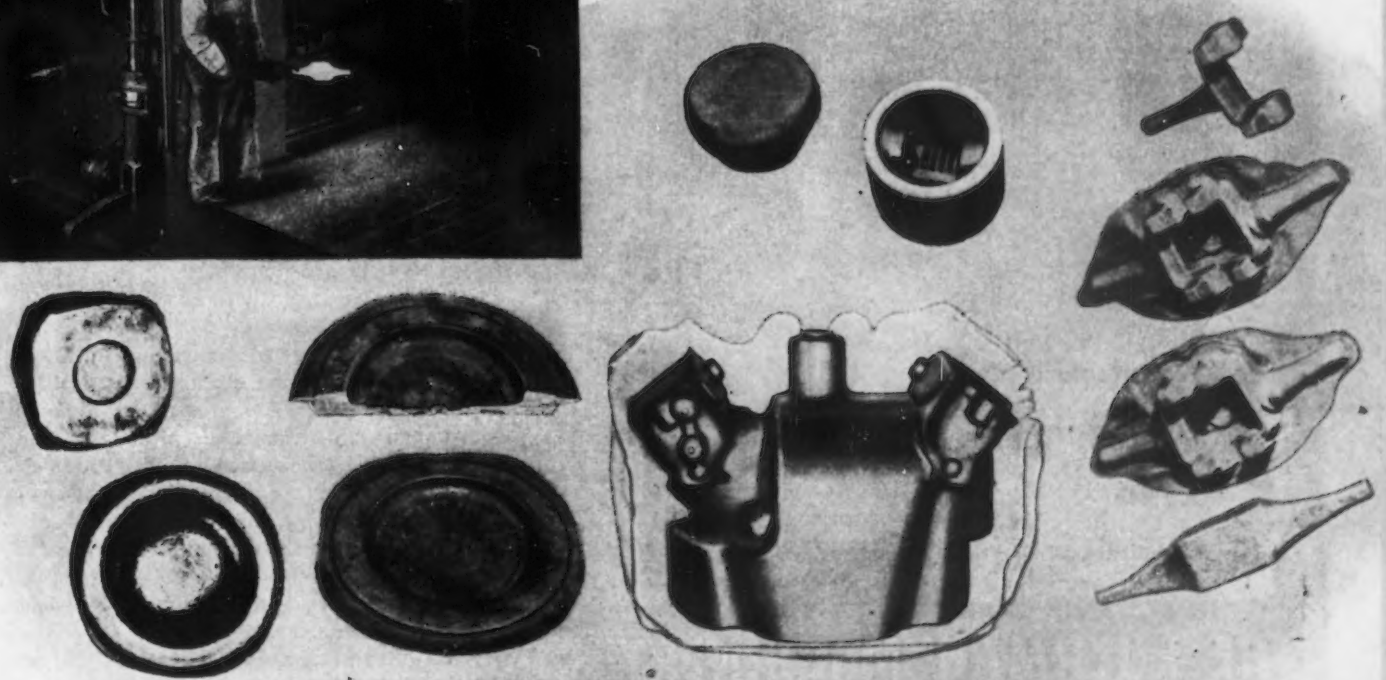
• • • **Studebaker Corp. has completed settlement of its claims on the government involved in $110 million worth of terminated military truck contracts.**

The agreement, reported to be the largest of its kind thus far approved, involves 445 claims from 367 subcontractors. The time of settlement was extremely rapid.

AJAX High Speed Forging Presses So Efficient in the Production of Automotive and Airplane Forgings

AJAX High Speed Forging Presses have proved so advantageous in the production of strong, accurate forgings to meet the unprecedented demands for automotive and airplane forgings, that the field of forgings being produced on these presses is rapidly expanding. Just as steering knuckles, steering knuckle support shafts, ring gears, pistons and even airplane cylinder heads are being forged at high production speeds and low cost, so can a great group of other parts in these and other industries be press forged with the same degree of accuracy and efficiency.

Write for Bulletin No. 75



THE AJAX MANUFACTURING COMPANY

EUCLID BRANCH P. O. CLEVELAND 17, OHIO

110 S. DEARBORN ST. • CHICAGO 3, ILLINOIS

DEWART BUILDING • NEW LONDON, CONN.

with Ruthman

GUSHER

COOLANT PUMPS

With the return to normal competitive conditions, the accent will be on increased production at lowered costs.

Here Ruthman Gusher Pumps are years ahead of their time. By actual test, they have proved their superiority time after time by giving efficient economical service with minimum maintenance costs.

So look ahead with Ruthman Gusher pumps. You can be sure that Ruthman is alert to improvements and refinements to give you the best product.

There's A "Gusher" for Every Requirement

WRITE NOW FOR OUR NEW CATALOG

THE RUTHMAN MACHINERY CO.

1821 READING ROAD CINCINNATI 2, OHIO

THE "GUSHER"

A MODERN PUMP FOR MODERN MACHINE TOOLS

CPA Outlines How To Get Priorities After Year Ending

Washington

• • • **In announcing that all of its field offices will be closed on or before Dec. 31, CPA took occasion to point out that criteria for qualifying for priorities have not been changed in any way by the new distribution system for the 541-a forms. To get steel, it was pointed out, it will be necessary to furnish information beyond that which applicants for CC or bottleneck breaking priorities assistance are required to give in PR 28.**

The following additional information is required in order to get steel:

(1) Sources of supply and yearly tonnage received from each source in 1939, 1940 and 1941.

(2) Shipments received in each of two months previous to the filing of the application.

(3) Copies of all orders already accepted, giving date, order number, tonnage and delivery promise.

(4) Absolute minimum amount of material required to operate plant until established sources of supply can reach the desired tonnage.

(5) Can a substitute material be used temporarily?

(6) Can the plant use its labor to produce other products from less critical types of steel until the type suggested can be furnished under normal conditions?

(7) State specific type and grade of material required and why such type and grade are necessary.

Effective Dec. 7 all applications for priorities, heretofore handled in field offices, were taken over by headquarters in Washington.

After Dec. 31, there will be no one available in any field office to aid applicants in filling out and filing of the application forms for priorities assistance. The present 13 regional and six district offices, although closed for the transaction of all CPA business after the first of the year—except for compliance matters—will only be used by the Compliance Div. and a limited number of administration personnel engaged in liquidating field activities.

Replacing the field offices as sources of supply for priority application forms, will be 115 first class postoffices in cities where CPA field offices have been located. The forms will also be available in the Smaller War Plants Corp. field offices. CPA of-

THAT the deadly accuracy of American Bombers, made possible by the Norden Bombsight, was a big factor in ending World War II is universally admitted.

Naturally an instrument capable of such pin point accuracy as the Norden Bombsight must be made of only the most precisely engineered and fitted parts.

The fact that 36 of these parts were Permite Permanent Mold Aluminum Castings bears high testimony to the accurate dimensions and uniform quality of Permite Castings.

The qualities of strength combined with light weight, resistance to corrosion and easy machinability, inherent in Permite Aluminum Alloy Castings, will prove equally valuable to your peacetime products as to the Norden Bombsight and so many other wartime implements.

When you use Permite Aluminum Castings it means that you get castings of superior physical and dimensional quality, as a result of strict specification adherence and critical supervision and inspection. Standardization of technique and modern laboratory control, supported by X-ray inspection and spectrographic analysis, further guarantee correct physical qualities.

Let us show you what Permite can do in meeting your castings requirements. Recommendations made without obligation.

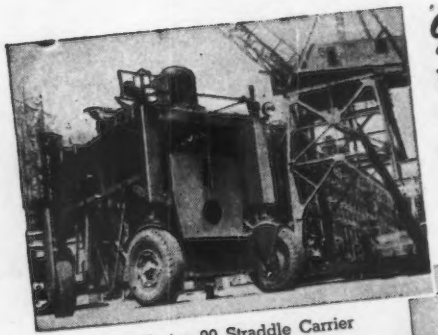
ALUMINUM INDUSTRIES, Inc. - CINCINNATI 25, OHIO

Detroit: 809 New Center Bldg. *Chicago:* 616 South Michigan Ave.
New York: 9 Rockefeller Plaza *Atlanta:* 413 Grant Building

PERMITE ALUMINUM ALLOY CASTINGS

8 Reasons Why THE ROSS SYSTEM Cuts Handling Costs

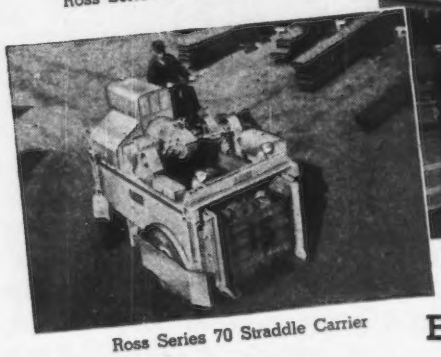
1. Eliminates all hand lifting and loading.
2. Minimizes manual re-handling of pieces.
3. Lessens tiresome toil for the workmen.
4. Standardizes on unit-assembly of pieces.
5. Saves valuable ground and storage space.
6. Keeps materials moving faster . . . for less.
7. Reduces operational overhead expense.
8. Increases profit-margins for the owner.



Ross Series 90 Straddle Carrier

Get the Facts about ROSS Straddle CARRIERS and LIFT TRUCKS..... FOR THE **BIG JOBS**

Ross Heavy Duty Lift Truck



Ross Series 70 Straddle Carrier

Write for Bulletin Today

IA-125

THE ROSS CARRIER COMPANY • Benton Harbor, Michigan

Direct Factory Branches and Distributors Throughout The United States and Canada

ROSS

HEAVY DUTY MATERIALS-HANDLING EQUIPMENT

ficials explained that there would be no one available in the postoffices to assist applicants in filling out the forms. The revised CPA 541-a forms, on which application is made for assistance in breaking industrial reconversion bottlenecks under PR-28, will also be available in Room 1501 Social Security Building, Washington, as will other forms which business may need.

The thirteen regional offices which will continue merely as operating bases for the Compliance Div. and for the administrative employees liquidating the entire field set-up are located in Boston, New York, Philadelphia, Atlanta, Cleveland, Chicago, Kansas City, Dallas, San Francisco, Detroit, Minneapolis and Seattle. For the same purpose, field offices will remain open in the following cities: Milwaukee, Los Angeles, St. Louis, Pittsburgh, Rochester, N. Y., and Newark, N. J.

Eight offices in Region six, with headquarters in Chicago, were closed last Nov. 30. They were located in Davenport, Iowa; Evansville, Fort Wayne and South Bend, Ind.; Green Bay, Wis.; and Peoria and Rockford, Ill.

National Scientific Roster Organizes For Reconversion Needs

Washington

• • • **The National Roster** of Scientific and Specialized Personnel of the U. S. Employment Service is engaged in bringing up to date its inventory of the names of 400,000 scientists and technicians to help meet the nation's reconversion needs, Dr. George A. Works, director, has announced.

Major industries already have filed large numbers of orders for technicians, as well as research and engineering personnel, Dr. Works said, and a complete checkup of the Roster has been launched to make sure that the records of registrants are up to date. As soon as the checkup is completed, it will show any changes in employment, new professional writing, new patents and inventions, and other important facts concerning the qualification of the country's scientists which have occurred since the original registration at the beginning of the war.

"The registry has continual value for statistical studies so that each profession may know at any time its present status and the trends of growth, education, and employment in its field," Dr. Works said. The fields

covered by the National Roster include: Accounting, administration and management, agricultural and biological sciences, architecture and planning, foreign languages, social sciences, physical sciences and engineering sciences.

One of the important jobs ahead for the National Roster, according to Dr. Works, is to assist the returning veteran with scientific or professional qualifications in locating suitable employment opportunities in industrial firms, colleges, universities and research laboratories. Dr. Works stated, "The development of the atomic bomb has sharply underlined the need for this nation to make sure that each one of its scientifically trained citizens is in a position to make maximum use of his talents to the end that this nation will be second to none in developments on the scientific front."

What! No Federal Help

Washington

• • • How the city of Indianapolis expects to clear up blighted areas without the aid of federal funds was described recently to the Senate Banking and Currency Committee by Paul L. McCord, chairman of the Board of Commissioners of the Indianapolis Redevelopment Dept. Mr. McCord testified for the Chamber of Commerce of the United States in opposition to the Wagner-Ellender-Taft Bill, which proposes federal subsidies for a large variety of housing activities, including urban redevelopment.

According to Mr. McCord, Indianapolis, like most cities, has some areas which have suffered severe depreciation and can be classified as slums. These produce low tax revenues, but require large expenditures for crime control and social welfare activities. It was determined that the city, through its municipal government, would be justified in spending tax money to remedy this condition, both for the sake of the economic savings and for the good of the community as a whole.

This task, Mr. McCord stated, is obviously beyond the power of private capital because the cost of land acquisition and the clearing away of existing structures would exceed any likely return on the investment. Vacant land within and outside of the city would be less expensive, it was said.

After considerable study a plan was worked out for attacking this

PAGE *for* WIRE

...AND THE RIGHT ANSWERS TO WIRE QUESTIONS

• If the question has to do with wire or the use of wire in production, PAGE can serve you. Wire and its application have always been the business of PAGE.

WHAT SIZE WIRE?

What size will do the job best and most economically? PAGE can give you the answer—and supply the wire.

WHAT SHAPE SECTION?

PAGE makes wire in many standard shapes. If you need a special shape, PAGE can make it for you—in end-section areas to .250" square—widths to 3/8". You draw the shape—PAGE can draw the wire.

WHAT ANALYSIS METAL?

PAGE is regularly drawing wire of high and low carbon steel, Armco ingot iron, stainless steel, special alloys. Heat-treating and finishes to required specifications.

WHICH WELDING ELECTRODE?

PAGE offers a wide range of welding electrodes and gas welding rods, including PAGE-*Allegheny* stainless steel.

When you have a question involving the use of wire, it will pay you to

. . . get in touch with Page!

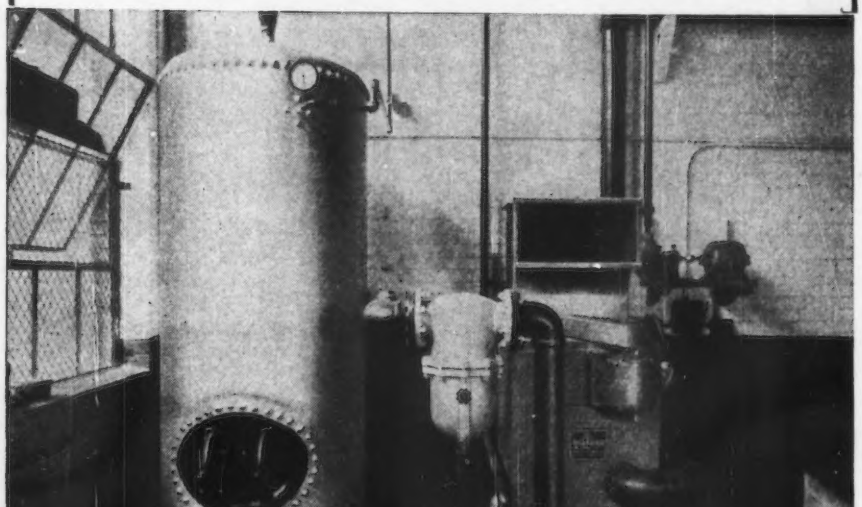
ACCO

Monessen, Pa., Atlanta, Chicago, Denver, Los Angeles, New York, Pittsburgh, Portland, San Francisco, Bridgeport, Conn.

PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE

NIAGARA *Aero*

AFTER-COOLER ASSURES DRY SANDBLASTING!



Many industrial plants answer the problems of rust in shot blasting and damage from condensed moisture in sandblasting with the NIAGARA *Aero* AFTER-COOLER. They report better than satisfactory results because of delivery of *drier air*. This is in addition to the 95% saving in water costs and constant jacket water temperature advantages made possible by *"Aero"* cooling and the Niagara "Balanced Wet Bulb" control.

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problem, the witness related. Under authority granted by the Indiana General Assembly last March, the city has set up a Redevelopment Dept. with power to levy taxes but not to issue bonds. By adding 10¢ to the prevailing tax rate of $3.45 per $100 for 2 yr and half this amount thereafter, a fund is being created which will be used to acquire blighted areas, clear them, plan for their redevelopment, and then offer them for sale to private enterprise. The city's contribution is limited to these services, and does not include any form of subsequent tax exemption.

As each project is completed, the returns from the sale of the land will be returned to the special fund and will be available for use in other areas. Ample safeguards are provided to protect the public interest in the designation of the areas to be redeveloped and to assure cooperation with other municipal agencies controlling parks, flood control, thoroughfares, utilities, and other services. The department must follow specified provisions for appraisal and the determination of prices, but is also given the right of eminent domain for use if necessary.

By virtue of this plan, said Mr. McCord, "we feel confident that we can do the job for Indianapolis without federal aid. We shall, of course, feel a little foolish if we proceed to do so with our own resources, and then wake up to find the Federal Government pressing subsidies on other cities which we shall have helped pay for. The answer to that suggestion, however, is not in our accepting federal aid, but in all other communities awakening to their own possibilities and the threat to our national existence of further deficit financing."

Adds to Teaching Staff

Pittsburgh

• • • **William O. Philbrook** has been appointed Assistant Professor of Metallurgical Engineering and a member of the staff of the Metals Research Laboratory at Carnegie Institute of Technology. Professor Philbrook is a native of Chicago and was graduated from the University of Chicago in 1934. Prior to joining the Tech faculty he was affiliated with the Wisconsin Steel Works, International Harvester Co., Chicago.

He is a member of the American Institute of Mining and Metallurgical Engineers, the American Society for Metals, and the American Chemical Society.

Company Makes New Five Spindle Turret Lathe for Trade

Cleveland

• • • **Recently President** Charles J. Stilwell of Warner & Swasey Co. laid down a guiding policy for his machine tool designers. "As producers of industrial equipment, we shall prosper in the postwar era if our new designs enable manufacturers to give into the hands of their workmen the means of producing more units per man. Lower costs will then open the way for higher incomes. That, in turn, will increase the volume of demand for finished products. In such a market," he cautioned, "successful competition must rest largely on quality instead of price."

This week his company brought out its first tangible embodiment of that policy—a five-spindle automatic turret lathe.

Only five minutes per slide are required it is said to set the working stroke from zero to maximum. This in itself means hours of saving in set-up time—which suits the new automatic to shorter production runs.

The simplified design making this possible was accomplished by eliminating the traditional multiplicity of cams and using in their stead a quadrant linkage to control each of the feed strokes.

By adjusting the fulcrum point of the stroke linkage on the graduated quadrant face, the feed is set with an accuracy that provides a positive lead-on for the use of threading tools.

As a means of "enabling manufacturers to give into the hands of their workmen an ability to produce more at less cost," this phase of originality in machine tool design appears revolutionary.

Carrying the same principle further, the five cross slides of the new automatic are equipped with separate micrometer adjustments. An 18-speed gear transmission provides quick selection of the rate of tool feed. Together, these latter features clip added minutes from the set-up time.

These more obvious features, built into the new design, amount to economic factors that make the new automatic usable at a profit on job lots ranging upward from normal turret lathe quantities.

Former losses on this type of equipment are substantially reduced by a new spindle drug indexing and locking mechanism.

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On Thanksgiving Day, 1895, the first automobile race ever run in America started from the building now housing the Museum of Science and Industry in Chicago. This event started the great race of industrial progress in America—a progress which has been paced by the dynamic automotive industry.

To commemorate this Golden Jubilee of the automobile, the Museum of Science and Industry recreated this race over the same course, with the same type cars, on Thanksgiving Day, 1945.

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Stocks in Principal Metal-Working Centers

Metal Show Already Drawing Big Demand For Reserved Space

Cleveland

• • • **Industry's interest** in introducing new developments and preparing for postwar sales is at an all-time high, judged by advance exhibit space reservations in the 27th National Metal Exposition, to be held the week of Feb. 4 in Cleveland's Public Auditorium.

"Representative manufacturers from all branches of the metal-working industries have already reserved 98 pct of the available floor space," according to W. H. Eisenman, managing director of the exposition, and national secretary of the American Society for Metals, sponsor of the event.

"With more than 340 companies represented," Mr. Eisenman continued, "total display area will be more than eight acres. This will be the largest industrial show ever held, exceeding the metal show of a year ago by some 25 pct."

Conservative estimates of attendance to the exposition are in excess of 30,000 industrial executives and engineers. Cleveland hotels will be packed and a special housing bureau has been set up by the Cleveland Convention and Visitors' Bureau to handle rooms in apartments and private homes.

Many visitors within a 100-mile radius of Cleveland plan to spend only a day at a time at the 5-day meeting and technical sessions of the National Metal Congress, held in conjunction with the Exposition, have been set up so that visitors may readily select visiting days to sit in on the sessions of definite interest to them and at the same time spend an afternoon and evening at the exposition.

Thirty-one technical sessions have been scheduled for Monday and Tuesday, Feb. 4 and 5, by the American Society for Metals, with headquarters in Hotel Statler. A series of four educational lectures will be presented on Thursday and Friday, Feb. 7 and 8.

The American Industrial Radium and Radiograph Society will have technical sessions Feb. 6, 7 and 8 at the Hollenden Hotel while headquarters for the American Welding Society will be Hotel Cleveland.

Bowles and Sen. Taft Debate Price Control Continuation Need

New York

• • • At the recent annual meeting of the National Assn. of Manufacturers here, Chester Bowles, Price Administrator, and Sen. Robert A. Taft of Ohio agreed on the need for controlling inflationary trends but were in complete disagreement on the means for achieving this end.

Bowles said "price control should and must be removed as rapidly as supply conditions permit. Barring continued labor-management difficulties, the production estimates for 1946 indicate that in industry-after-industry during the next 12 months we will find supply and demand coming into balance. As that occurs, I assure you that your government will move promptly to eliminate the last vestige of price restrictions in those industries. But to remove them before competitive conditions are again established is to invite inflationary chaos.

"The recommendation of your leaders for the removal of price control in 60 days is reckless in the extreme. Just how high prices would go I do not know. But at the best it is a risky, reckless, gambling policy which in all likelihood would produce a national disaster."

He said that "this opposition to effective price control is a departure from the original NAM stand when wartime price controls were first proposed.

"In 1941 when price and rent control legislation was under discussion, the stand of NAM was clear cut. Noel Sargent, who was then secretary, testified before a congressional committee that firm controls on prices were an absolute essential to meet the inflationary circumstances created by war. In many respects his recommendations went beyond the actual program which your government has put into effect.

"I am told that Mr. Sargent's testimony was a major factor in securing the passage of the original price control act. But more recently your position has changed. To some degree in 1943 and increasingly in 1944 and 1945 you have swung into sharp opposition to effective price control.

"Today it is generally recognized that inflationary pressures are at record levels. Liquid assets are at an

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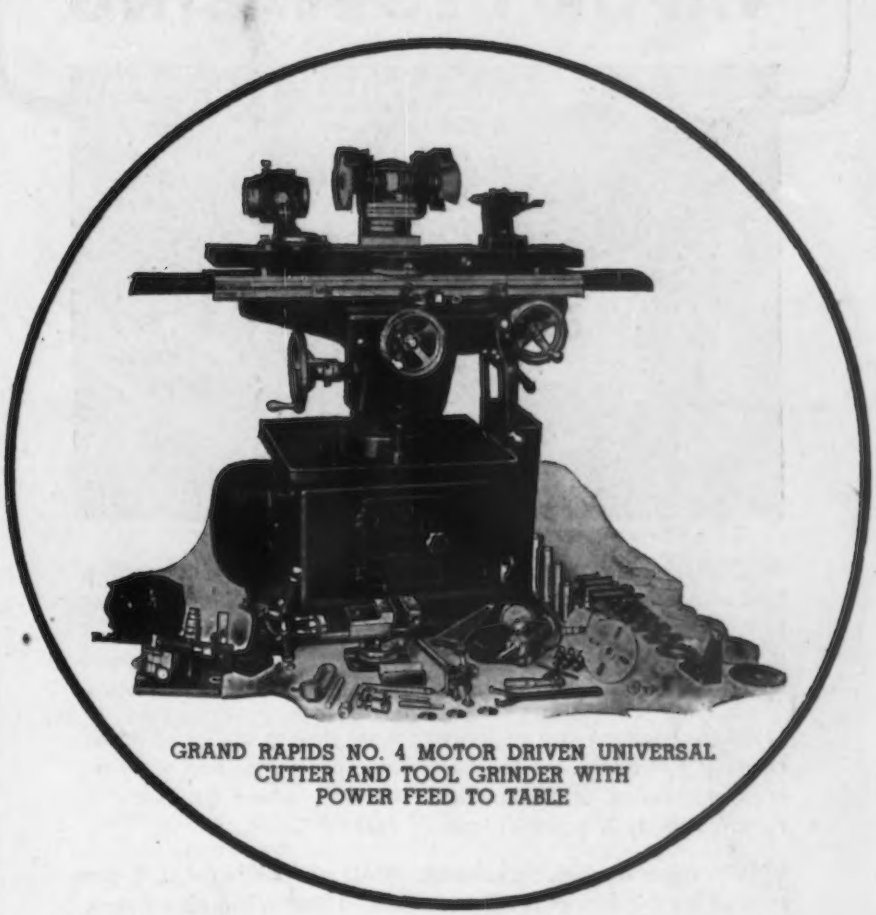

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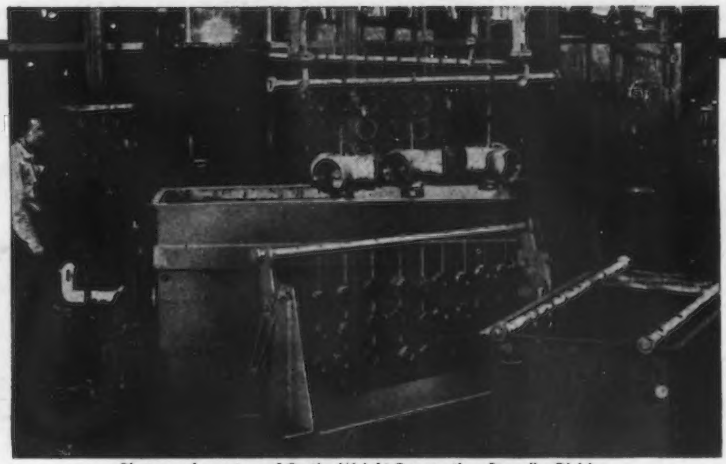

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all-time-high. Savings have increased from prewar levels by $145 billion. Currency in circulation is almost five times as great as before the war.

"The stock market has been booming merrily upward. As in 1929 taxi drivers, barbers and elevator boys are providing inside information on just what selections are apt to rise the fastest. The dope sheets coming from Wall Street anticipate higher and still higher prices. The real estate market is starting to skyrocket.

"What, under such circumstances, would happen to prices if the nation now accepted the advice which Robert R. Wason, chairman of the NAM Reconversion Council and John Airey, chairman of the NAM War Control Termination Committee offered to Congress on Nov. 7. This NAM recommendation called for the elimination of all price controls by Feb. 15. What, for instance, would happen to food prices?

"Those of you who are in the candy business know that cocoanut, which OPA decontrolled some thirty days ago, has quadrupled in price. Many grades of furs, from which price controls were removed during the fall months, have more than doubled. Your wife will tell you that some grades of oranges, lemons and grapefruit moved up 50 to 100 pct in the first few days following the action by OPA in removing the price restrictions.

"If this occurred on food products which seemed to be in adequate supply, what would happen to meat, vegetables, milk, cereals and all the other dozens of food products which are in more scarce supply?

"If the nation accepted the advice of your leaders to drop price control 60 days from now, what would happen to clothing prices? Right now the apparel situation is tighter than it has been since the beginning of the war.

"Our veterans in search of their first outfit of 'civvies' are forced to walk from store to store and even then often fail to secure the clothing to fit their needs. All authorities agree that this shortage is likely to continue for a great many months to come.

"If we accepted your official recommendation of the early removal of all price control, what would the public be asked to pay for automobiles, refrigerators, washing machines and vacuum cleaners. Some say that competition would take care of all

that. I can only say that this expectance is not in line with the facts.

"The original requests of OPA by manufacturers were for increases ranging from 25 to 55 pct. On Oct. 26 and 27 orders were taken for 300,000 Ford cars, one-third of the entire 1941 production—with no questions asked on prices or trade-ins.

"If the nation accepted the official NAM recommendation, what would happen to the price of building materials? During the method of the first World War, the cost of lumber, soil pipe, brick and other essential building materials tripled. Today the housing shortage is infinitely greater. Under the best of circumstances I am told that only 500,000 homes can be built in 1946.

"This will be meagre relief to the 3,401,000 families, a major portion of them young married veterans, who will be forced to live with relatives, or otherwise double up during the coming year. If we removed price controls, is there any limit to the heights to which building materials would move in 1946? Certainly not judging from what occurred 25 yr ago.

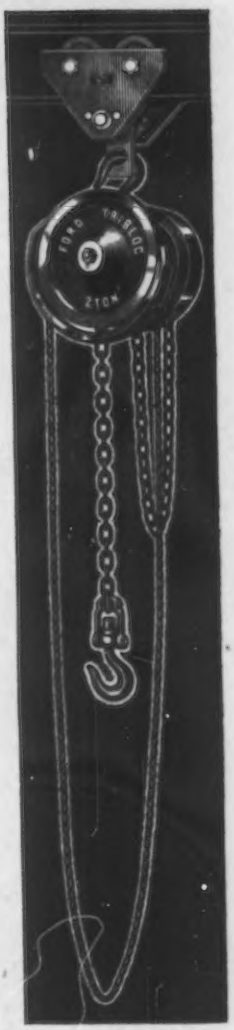
"If we accepted the official advice of the NAM what would happen to rents? We could not remove price controls without removing rent controls. We know that in the period of the last war 90 pct of the entire increase in rents occurred not during the war itself but after the armistice. In view of the critical housing shortage, could we expect any greater restraint on the part of our landlords today?

"Finally if we accepted the advice of your leaders what would happen to wages? Today most of you feel that the demands of the labor groups are excessive. If controls were ripped off as you propose, if rents were allowed to shoot upward, if food and apparel prices were allowed to boom, labor would very properly intensify its demands for higher and still higher pay checks.

"History has proven that in a race between prices and wages, prices invariably go up faster. Under such circumstances, however, our workers would have but one defense, and that would be to get what they could as fast as they could get it in the hope of keeping their incomes within speaking distance of the rising cost of living.

"Organized labor could at least make an effort to keep its earnings

FORD TRIBLOCS
. . . smooth in operation



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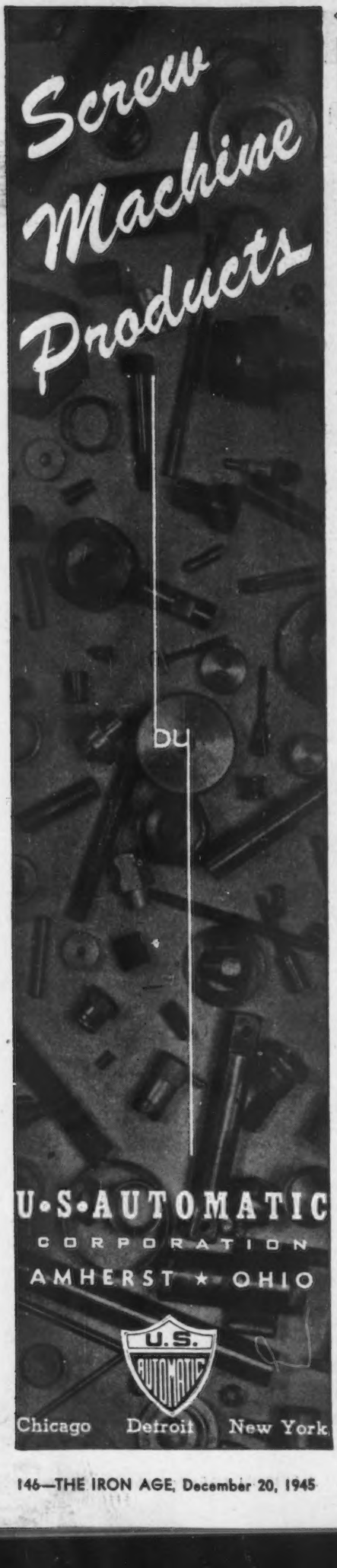

in line with increasing living costs. But how about the millions of workers, farmers, and people living on fixed incomes who have no strong unions to protect them? What would happen to them as prices and rents shot upwards?

"Finally how about the businessmen if the nation accepted the official advice of the NAM? Prices that skyrocket invariably collapse. How would our businessmen, particularly our small businessmen, fare as inventories were thrown on the market for any price they would buy and as the inevitable drop in purchasing power dried up their sales?

"We had 106,000 bankruptcies following the collapse after the inflationary rise in 1919 and 1920. If we ripped off our inflation controls today could we expect less in 1947?

"Your leaders say they fear inflation as much as I do. They agree with me that production, production, and still more production is the only final cure for the inflationary danger.

"But it is their claim that price control interferes with production, and that if price controls were removed the whole situation would take care of itself. The record has proved them emphatically wrong in the past. The record indicates that their claim is equally wrong today.

"Last week the President's report stated reconversion has been achieved at record speed. Manufacturers of automobiles, washing machines, electric refrigerators, and other reconversion products, reporting to the CPA estimated their volume of sales by June 1946 at from 75 to 300 pct above 1939 levels—all under OPA price controls.

"Retail sales today, again under the very price controls which your leaders claim make all-out production impossible, are breaking every record.

"Admittedly, price control has never been painless. Admittedly, it can never be painless. Obviously, there have been some delays, some fumbling, some outright mistakes. Every day we are moving to correct these mistakes and to eliminate hardship to the fullest extent of our ability."

Senator Taft said "the Government today is pursuing two diametrically opposed policies, one to support a general increase in salaries and wage rates, and the other to keep retail prices frozen. This policy, in the immediate future, threatens reconversion and re-employment to such an extent that it may actually throw

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our economy into a tailspin. The government is already predicting a total unemployment load of 8,000,000 which I believe to be wholly unnecessary if we can return to common sense in economic policy. If the policy is combined with general strikes which further check production, we may repeat our experience of 1920.

"The Administration does not or will not recognize that higher prices are not inflation, but are the result of inflation. Inflation occurred in the tremendous increase of government debt and the tremendous increase in currency circulation, in the increased costs of material and labor. Higher prices are the necessary and inevitable result. A policy of continued public spending combined with a policy of encouraging general increases in the whole wage rate level is bound sooner or later to bring about a further increase in the whole level of prices in this country to a point which will produce hardship on many, speculative profits for a few, a boom like 1929, then again a major depression such as that of 1932."

He said that "undoubtedly, war economic conditions still exist to some extent. There is still a deficit, although I should hope that it might be financed from genuine savings without using inflationary methods. Production has not been resumed and there are numerous bottlenecks which will exist for some months. We had an experience after the last war which shows how the effect of war conditions may continue for awhile, particularly as to commodities of which there is a great shortage. I believe that the continuation of price control at the present time is justifiable, and I believe that after July 1 it will probably be necessary to continue it as to certain particularly scarce articles. I believe Congress should definitely limit the field, however, when it is renewed.

"Any government bureau is inclined to perpetuate itself. The OPA has released a few unimportant articles from price control such as sleigh bells in Hawaii, but it has made no important modification as yet. Apparently, Mr. Bowles' view is that an article of any importance must return to normal conditions of demand and supply before price control is removed. In many fields such normal conditions may not be wholly restored for years. In others supply can perhaps only be obtained by permitting the price to rise. I do not think the OPA can be trusted with the decision as to what articles must

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No. 2 Draw Cut Hack Saw. Companion to the No. 1 but with a normal 6" x 6" capacity which can be increased to 8" x 8" by shortening the stroke with adjustable crank. The No. 2 MARVEL also has a swivel vise which is removable from the "T" slotted bed. For mitring special fixtures to be mounted. Both machines are available in belt and motor driven models. Motor driven models can also be furnished mounted on portable truck.

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still be controlled after July 1, 1946.

"My criticism of the OPA is of the methods it has pursued. I believe it has entirely departed from the original purpose of the Price Control Act and is gradually setting up a complete control of profits instead of prices. The original act contemplated that prices be fixed where they were at a particular date and that adjustments should then be made for such relevant factors as might be of general applicability, including general increases or decreases in cost of production, distribution, and transportation, and general increases or decreases in profits earned by sellers of the commodity or commodities during and subsequent to the year ending Oct. 1, 1941.

"In other words, price control was to be based on the existing price structure. In my opinion this was the general price structure of each commodity and not the average of whole classes of commodities which might be manufactured or distributed by a particular industry. In general, this price structure was a uniform price through the entire industry, returning perhaps large profits to some concerns and no profits at all to others. I don't see that the same percentage of mark-up over cost was to prevail and admit that profits of an industry as compared to 1941 (not 1936-1939) should be given some consideration. Basically, the purpose of the act was to prevent an increase in prices except as it might be forced by an increase in cost. Wages were not fixed in the first act, and it was recognized that increases in wages would have to be reflected by increases in prices.

"The OPA for three years has entirely disregarded the principles of the Price Control Act. It adopted, instead, the so-called freeze theory by which all prices to the ultimate consumer were frozen, regardless of other considerations. I do not think any such disregard was justified by the Stabilization Act of Oct. 2, 1942. It was really justified only on the ground of necessity, on the argument that you could not have a controlled inflation and if you wanted any control at all you had to disregard the act and freeze prices. This argument is nonsense. What we have now is a controlled inflation. Price increases are being granted at various points, because otherwise production would cease.

"The retail freeze theory has failed in every country where it has been tried. It has been more success-

ful here than elsewhere, but if you would go out and shop in the stores of New York you would hardly believe that an OPA exists. It has succeeded in holding down the cost of living insofar as it relates to essential articles for city families, but it has not prevented a growing black market in many classes of goods. It has been accomplished by holding down the legitimate operators in each industry, in many cases to an unjust price, while eliminating many of the smaller companies and encouraging the development of thousands of fly-by-night concerns which feel no responsibility to law, or get special prices from the OPA.

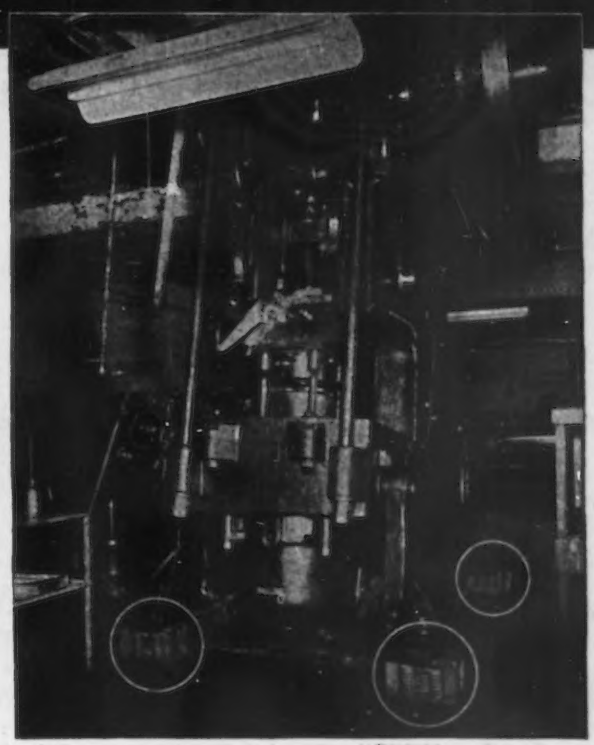
"In order to maintain the fetish of a retail price freeze, the OPA has resorted to every possible device to make industry absorb increased costs. Its price fixing is based on the profits of the largest manufacturers so that many others are forced to sell at a loss. Special adjustments are then made for individual concerns. This means that each concern has a different price. This means that the OPA is fixing profits for each company and not fixing a general price level. The tighter the squeeze becomes, the closer the margin, the more we have profit control and not price control.

"During the war I protested often against the OPA program, because I felt it was unjust and encouraged black market operations. However, concerns which suffered might then be regarded as casualties of the war. I voted for the continuation of the OPA, knowing the policies which they were carrying out.

"Today we have an entirely different condition. The problem now is to get production and employment. If we can get production, prices will come down by themselves to the lowest point justified by increased costs. If we hold prices at a point where no one can make a profit, there will be no expansion of existing industry and no new industry in that field. We must adopt a policy which, while preventing the skyrocketing of prices, recognizes that some increase is necessary to bring about their ultimate production.

"We have seen the effect of the policy already. Except for the black market break-down in the case of various commodities from May 1943, until May 1945, straight-time hourly earnings rose 11 pct while the cost of living only rose 2½ pct as shown by the reports of the Bureau of La-

Now is the Time to Isolate Costly Punch Press Vibration



Four Korfund Type SL/K Vibro-Isolators effectively absorb the shock from this Bliss 100 Ton Capacity Press

You can't operate punch presses without vibration. Whether you realize it or not, uncontrolled vibration takes a constant toll in building damage, machine breakdowns, accidents, spoiled work and lowered employee efficiency.

But there is no reason why you can't be protected from vibration. Vibration can be isolated completely—and economically—through Korfund Vibration Control.

And the logical time to take advantage of the simple, sure results of Korfund Vibration Control is while presses are shut down during your reconversion period.

Ask for a Korfund Vibration Control Engineer to recommend the proper isolators for your equipment. We have representatives in principal cities. In the meantime, ask for Catalog H-600.

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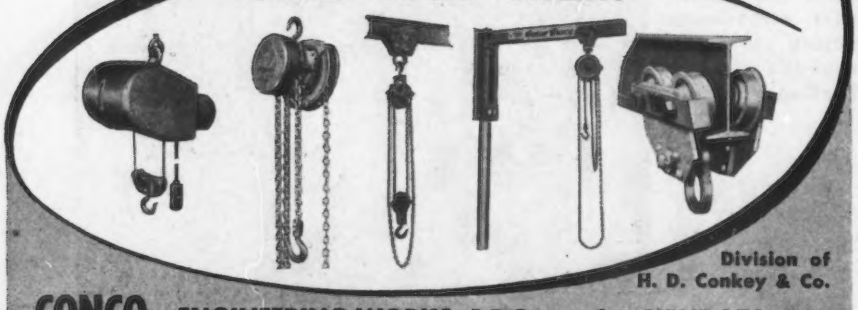

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A major wire development . . . a better coating than tin . . . can be substituted for tin. No government restrictions. Sizes .003" to .080".

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bor Statistics. In other words, on the average, industry was compelled to absorb more than a 9 pct increase in cost during these two years. Many industries were able to do this, particularly when they had a large volume of war business, but others were forced out of business or compelled to do business at a loss.

"We saw this result in the case of the small packers. We saw it in the disappearance of many textile goods from the market. I have cited many other instances. The OPA admits that they are compelling many lines of commodities to be sold at a loss and that some industries are compelled by regulation to do business at cost. But the fetish of an absolutely frozen retail level has been maintained in the face of conditions which necessarily forced higher costs.

"By requiring products to be made at a loss, this policy kills production which is the only ultimate method of reducing prices. Prices of finished products should be uniform and there should be a margin for the entire industry, based on some prewar margin. This is not a guarantee of profits, because on that margin the efficient concerns will make money and the inefficient concerns will not, just as before the war.

"In the second place, the policy of the OPA has been completely unjust to many concerns, especially the smaller companies without representation in Washington. There has been a strong anti-business prejudice, and every businessman is met by the assumption that he is trying to make more than he ought to make. Mr. Bowles in his statement on Oct. 23 before the Banking and Currency Committee denounced businessmen as greedy and as pressure groups.

"In the third place, the whole attitude of the price administration is hypocritical. It pretends that it desires to make adjustments, but it does not intend to do so and seldom does. Applications for increases lie for months in the different sections of the OPA. They are granted by one section and refused by its superior. If one is finally granted, it is probably half the increase justified by the evidence and often admitted to be fair by officials in the OPA itself. By that time costs have again increased. One Senator said that OPA has a defense in depth. Certainly it has made it effective."

Construction Steel...

New York

• • • Fabricated steel awards this week included the following:

9086 Tons, France, transity shed (probably means train stations) through U. S. Steel Export Co., to American Bridge Co., Pittsburgh.

4800 Tons, St. Louis, assembly building, office building, oil house and powerhouse for Ford Motor Co., to American Bridge Co.

2735 Tons, Wilmington, Del., office building, Turner Construction Co., to American Bridge Co., Pittsburgh.

2611 Tons, Palatka, Fla., bag plant, Hudson Pulp & Paper Co., to Aetna Iron Works.

1794 Tons, Detroit, bus service station, to R. C. Mahon Co.

1560 Tons, Meadville, Pa., plant extension, to Bethlehem Steel Co., Bethlehem, Pa.

1099 Tons, Detroit, warehouse building, Central Steel & Wire Co., to American Bridge Co., Pittsburgh.

953 Tons, Columbia, S. A., transmission towers, through U. S. Steel Export Co., to American Bridge Co.

900 Tons, Irvin, Pa., galvanizing building, Carnegie-Illinois Steel Corp., to American Bridge Co., Pittsburgh.

900 Tons, Bruce, N. C., extensions to Cliffside Steam Station, Duke Power Co., to Virginia Bridge Co., Roanoke, Va.

900 Tons, Buffalo, N. Y., addition to Sattler's Department Store, to R. S. McMannus Steel Construction Co., Buffalo, by Siegfried Construction Co., general contractors.

818 Tons, Newark, N. J., Essex Station extension, Public Service Electric & Gas Co., to American Bridge Co., Pittsburgh.

800 Tons, Buffalo, N. Y., Truscon Steel Co. warehouse, to Republic Steel Corp., Cleveland.

700 Tons, Cedar Rapids, Iowa, road buildings, successful bidder not known but award made.

624 Tons, San Jose, Calif., Coyote Creek bridge, to Bethlehem Steel Co., Bethlehem, Pa.

475 Tons, Minneapolis, farm machinery parts, Superior Separator Co., to American Bridge Co., Pittsburgh.

463 Tons, Lexington, Ky., factory building, to Bethlehem Steel Co., Bethlehem, Pa.

450 Tons, Mason City, Iowa, highway under crossing, to American Bridge Co., Pittsburgh.

448 Tons, Morton Grove, Ill., factory building, Baxter Laboratories, Inc., to American Bridge Co., Pittsburgh.

435 Tons, Dayton, Ohio, building, to Berger Iron Co.

416 Tons, Old Fort, N. C., rayon plant, Clearwater Mfg. Co., to Bethlehem Steel Co., Bethlehem, Pa.

400 Tons, Chester, Pa., parts building for Ford Motor Co., to Irwin-Layton Co., Philadelphia.

347 Tons, Minneapolis, parts warehouse, Minneapolis Bridge Construction Co., to American Bridge Co., Pittsburgh.

344 Tons, Northfield Township, Ill., bridge, Cook Co., Ill., to American Bridge Co., Pittsburgh.

339 Tons, Chicago, building, to H. E. Gramp & Co.

332 Tons, Wallingford, Conn., bridge, to Electric Boat Co.

325 Tons, Lansing, Mich., extension to building, 56 for Olds Motor Div., to Whitehead & Kales Co., Detroit.

300 Tons, Mooringsport, La., power plant, to unidentified fabricator, through Sargent & Lundy, contractor.

299 Tons, Findlay, Ohio, office building extension, Sam W. Emerson Co., to American Bridge Co., Pittsburgh.

279 Tons, Minneapolis, office, warehouse, and shop building, to Minneapolis Moline Implement Co.

211 Tons, New Brunswick, N. J., warehouse,

SPECIFICATIONS
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Improved Working Conditions

Therm-O-Flake Coating Vertical walls — bulkheads — roofs — arches.
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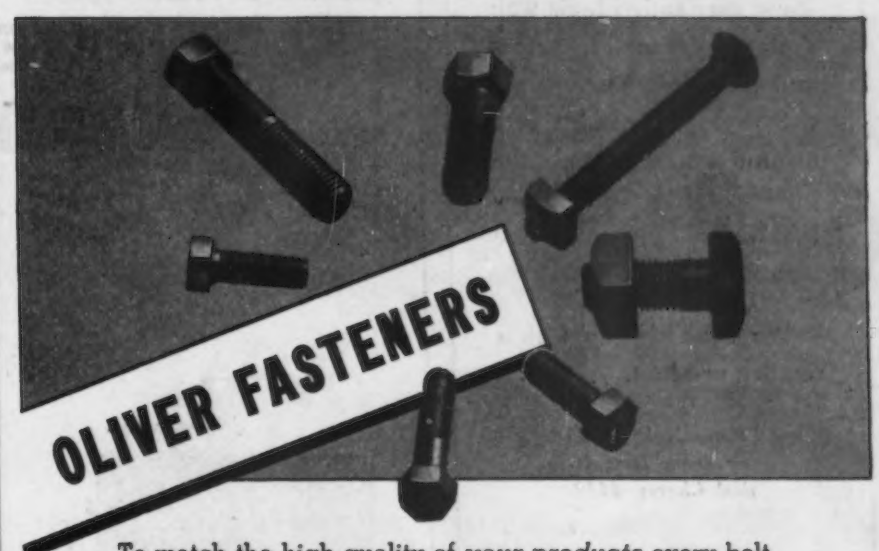
Therm-O-Flake Concrete Flue — Checker Chamber Hearth Bottoms.

Illinois Clay Products Company
JOLIET, ILL.
High Temperature INSULATION



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Corporation

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Morrison Steel Co., to American Bridge Co., Pittsburgh.

209 Tons, Chicago, building, B. T. Babbitt, Inc., to American Bridge Co., Pittsburgh.

200 Tons, Covington, Va., Jackson River Bridge, Echols Bros., Inc., to Virginia Bridge Co., Roanoke, Va.

200 Tons, North Tonawanda, N. Y., Durez Plastics & Chemicals, Inc., addition, to R. S. McMannus Steel Construction Co., Buffalo.

187 Tons, Minneapolis, factory building, Foley Mfg. Co., to American Bridge Co., Pittsburgh.

153 Tons, Philippine Islands, service building, through U. S. Steel Export Co., to American Bridge Co., Pittsburgh.

144 Tons, Peoria, Ill., warehouse roof, V. Jobet & Sons, to American Bridge Co., Pittsburgh.

125 Tons, Stamford, Conn., Pitney-Bowes, Inc., plant addition, through Turner Construction Co., New York.

125 Tons, Erie, Pa., Hammermill Paper Co. power house to American Bridge Co., Pittsburgh.

120 Tons, Braddock, Pa., machined frames, Oil Well Supply Co., to American Bridge Co., Pittsburgh.

Unspecified Tonnage, Lansing, Mich., dormitory for women, Michigan State College, to Christman Co., Lansing, Mich.

• • • **Fabricated steel inquiries** this week were as follows:

1000 Tons, Minneapolis, Sears Roebuck & Co., mail order warehouse.

1000 Tons, Detroit, Pfeiffer Brewing Co., plant.

500 Tons, Crawfordsville, Ind., addition to R. R. Donnelly & Sons Co., plant.

250 Tons, Kelso, Wash., Coweman River highway bridge, bids Dec. 27 to State Director of Highways, Olympia.

200 Tons, LaPorte, Ind., Allis-Chalmers Mfg. Co., experimental building 89.

Reinforcing bar awards this week included the following:

1275 Tons, Peoria, Ill., Hiram Walker Distillery rack house to Laclede Steel Co., St. Louis.

1000 Tons, Springfield, Ohio, Crowell-Collier Publishing Co., to Truscon Steel Co., Youngstown, Ohio, through the Austin Co.

900 Tons, Los Angeles, Brunswig Drug warehouse, to Ceco Steel Products Co.

700 Tons, Rochester, N. Y., Eastman Kodak Co., color film processing plant, to Bethlehem Steel Co., Bethlehem, Pa., through Ridge Construction Co., Rochester, N. Y.

450 Tons, Minneapolis, Dayton Stores building, to Paper, Calmenson & Co., St. Paul.

350 Tons, San Diego, Cal., highway bridge, to Truscon Steel Co., Youngstown.

300 Tons, San Diego, Cal., overhead crossing, to Soule Steel Co.

300 Tons, Mansfield, Ohio, Westinghouse Electric Corp., factory buildings, to Bethlehem Steel Co., Bethlehem, Pa., through Dick Construction Co., Pittsburgh.

200 Tons, Trenton, N. J., Bayer Co. Aspirin Plant addition, to Truscon Steel Co., Youngstown, Ohio, through Austin Co., New York.

175 Tons, Paducah, Ky., U. S. Engineers, flood control, to Laclede Steel Co., St. Louis.

150 Tons, North Chicago, Ill., Abbott Laboratories building, to Jos. T. Ryerson & Son, Inc., through Carroll Construction Co., general contractor, Chicago.

130 Tons, North Tonawanda, N. Y., Durez

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• If you have been doing business with Holly for the past decade or so you already know Walter Bergers. If you are unacquainted with our staff and ask for the Sales Manager you will meet him.

Mr. Bergers is one of those rare individuals who designs, estimates, prices and sells Holly springs. As the saying goes, he gets around and although the photograph doesn't show it, Walter gives service with a smile.

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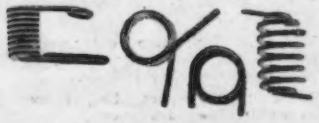
Speed and accuracy are fundamental qualities of Torrington Spring Coilers. Fourteen sturdily constructed models coil wire diameters from .003" to .750". Accuracy increases high production rates by minimizing hand inspection and rejections. Torsion and other attachments for special types of springs are available. A brief description of your spring coiling problems will bring our prompt, detailed reply.

Almost any useful spring can be made on a Torrington Spring Coiler. Here are a few examples:



THE TORRINGTON
MANUFACTURING COMPANY
TORRINGTON, CONNECTICUT

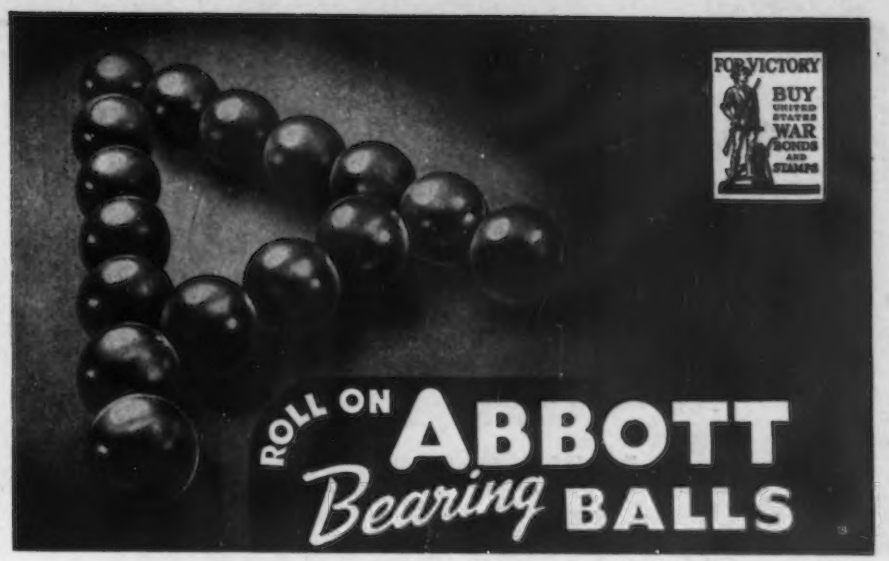
Plastics & Chemicals, Inc., addition, to Truscon Steel Co.

Reinforcing bar inquiries this week included the following:

1000 Tons, Toledo, Ohio, grain elevator.
600 Tons, Milwaukee, Blatz Brewing Co., building.
500 Tons, Milwaukee, Schlitz Brewing Co., building.
450 Tons, St. Paul, Minn., Ziegler Corp., structure.
400 Tons, Minneapolis, Minneapolis Honeywell Regulator Co., building.
400 Tons, Milwaukee, Gimbel Bros. store.
350 Tons, Minneapolis, Minneapolis Star-Journal publishing plant.
183 Tons, Petaluma, Cal., San Antonio and Novato Creek state highway bridges, bids Jan. 9 to Div. of Highways, Sacramento.
130 Tons, Aurora, Ill., Copley Hospital.
120 Tons, St. Paul, Minn., Farmers Union grain terminal.
109 Tons, Kelso, Wash., Coweman River highway bridge, bids Dec. 27 to State Director of Highways, Olympia.

Sheet piling inquiries this week included the following:

2500 Tons, Chicago, shore protection, Paschen Contractors, Inc., general contractor.
7000 Tons, Van Nuys, Calif., assembly plant, General Motors Corp., Chevrolet Div.
1200 Tons, Peoria, Ill., brewing house, Pabst Brewing Co.
1000 Tons, Staten Island, N. Y., Arthur Kill Station, Staten Island Edison Co.
750 Tons, Oceanport, N. J., grandstand roof, Monmouth Park Jockey Club.
500 Tons, Cambridge, Mass., building, National Research Corp.
475 Tons, Minneapolis, farm machinery parts, Superior Separator Co.
300 Tons, Chicago, factory building, L. B. Foster Co.
300 Tons, Baltimore, plant extension, Lever Bros. Co.
300 Tons, Peoria, Ill., office and laboratory building, Pabst Brewing Co.
275 Tons, Fitchburg, Mass., plant addition, National Lead Co., Magnus Div.
260 Tons, Chicago, factory and office building, Pyramid Metals Co.
250 Tons, Winstead, Conn., building, Winstead Hardware Mfg. Co.
250 Tons, Bedford Park, Ill., factory, general Scientific Corp.
250 Tons, Lyndhurst, N. J., factory building, Italian Cooking Oil Co.
2380 Tons, Dayton, Ohio, bakery and warehouse, Loose-Wiles Biscuit Co.
1685 Tons, Clifton, N. J., manufacturing plant, Federal Telephone & Radio Corp.
1662 Tons, Jamaica, N. Y., store building, R. H. Macy & Co.
1000 Tons, Omaha, Neb., rock barges, U. S. Engineers Office.
700 Tons, Cedar Rapids, Iowa, road builders, La Plante-Chaote Mfg. Co.
624 Tons, San Jose, Calif., bridge, State of California.
503 Tons, Tonawanda, N. Y., plant addition, Eastern States Cooperative Milling Corp.
418 Tons, Trenton, N. J., warehouse, Westinghouse Electric Corp.
390 Tons, New Brunswick, N. J., manufacturing and office building, American Coating Mills.
322 Tons, Cincinnati, garage building, owner unknown.
313 Tons, Garland City, Ark., pile sections, St. Louis & Southwestern Railway Co.
560 Tons, Wasco County, Oregon, Mill Creek highway bridge, general contractors.
1290 Tons, Kenonah, Ala., sinter plant extension, Tennessee Coal, Iron & Railroad Co.
492 Tons, Bessemer, Ala., shop building, W. L. Costan & Sons.
380 Tons, Tarboro, N. C., beam spans, North Carolina Highway Dept.
1144 Tons, Memphis, Crump Stadium, City of Memphis.



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Expansion Program To Include Building And New Plant Additions

Chicago

• • • **International Harvester Co.** is planning to build or buy a plant for its refrigeration division, to acquire a motor truck assembly plant on the West Coast, and to enlarge its West Coast implement plant, Fowler McCormick, president, revealed recently.

As part of a $100,000,000 expansion program, the company recently purchased from the government for $13,750,000 an aircraft engine plant, operated during the war by Buick, located at Melrose Park, Ill., near Chicago. Grading has been completed for a farm implement plant at Memphis, at which cotton pickers will be built, and grading is underway for a farm tractor plant at Wood River, Ill., in the St. Louis area.

Due principally to a decline of 70 pct in military sales, sales for the fourth quarter of the company's fiscal year, ending Oct. 31, dropped approximately 33 pct from the corresponding 1944 period. Sales of civilian products, however, increased approximately 44 pct from the fourth quarter of 1944 and about 3 pct from the third quarter of 1945. Total 1945 fiscal year sales will be below the 1944 sales of $640 million, Mr. McCormick predicted.

With the completion of virtually all military production, Harvester has closed two exclusively military plants at St. Paul and New Brighton, Minn., and will wind up operations at a third, at Bettendorf, Iowa, about January 1946.

RFC Sells Machine Tools

Chicago

• • • **Sale of approximately 208 standard general purpose machine tools is being conducted by the Reconstruction Finance Corp. at Plant No. 2 of Elgin National Watch Co., Elgin, Ill., with pricing on the Clayton formula basis.**

The tools include bench drills, bench grinders, broaching machines, chucking machines, drilling machines, drilling and tapping machines, hobbing machines, inclinable presses, knee type millers, milling machines, a profiling machine, a routing machine, shapers, spinning machines, tapping machines, and wet grinders. Inspection periods are from 9 a. m. to 4 p. m. daily except Saturday and Sunday.